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The Economic Impact of the Red Imported Fire Ant on the Homescape, Landscape, and the Urbanscape of Selected Metroplexes of Texas

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The Economic Impact of the Red Imported Fire Ant on the Homescape, Landscape, and the Urbanscape of Selected Metroplexes of Texas: A part of the Texas Fire Ant Initiative 1997-1999

This report is a part of a series on research studies focused on the control and management of the fire ant in Texas. It was prepared without formal review by the Department of Agricultural Economics, Texas Agricultural Experiment Station or Texas Agricultural Extension Service. The study was conducted under the sponsorship of the Texas Fire Ant Initiative-Internal Competitive Grants program with the funds allocated from the Texas Department of Agriculture. This report fulfills the terms of the Competitive Grant contract. The authors welcome comments or information about the utility or applications of this report. Please address all comments to:

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The research project was a cooperative effort by Texas A&M University, the Texas Agricultural Experiment Station, the Texas Agricultural Extension Service and the sponsoring organization, the Texas Department of Agriculture. The main source of funding was the Texas Department of Agriculture through the Texas Legislative Fire Ant Initiative. The survey data collected pertained primarily to calendar year 1998. The Texas Agricultural Statistical Service (TASS) assisted through a subcontract in the collection of data from the single-family households in the five selected metropolitan areas of Austin, Dallas, Ft. Worth, Houston and San Antonio. The primary objective of this project was to establish the various economic impacts of the imported fire ant upon related sectors in the urbanscapes of the metroplexes listed above. These results can be used to assess damages and estimate the potential costs and benefits of control and management programs.

The Economic Impact of the Red Imported Fire Ant on the Homescape, Landscape, and the Urbanscape of Selected Metroplexes of Texas

Abstract

The imported fire ant has become a major economic pest to various sectors of the Texas economy. In order to determine the economic impact of this pest on selected urban areas, an economic study was conducted in 1998-1999 in the 5 metroplexes of Austin, Dallas, Fort Worth, San Antonio and Houston to estimate the costs of controlling and managing fire ants.

The main purpose of this study was to estimate the annual economic impact of the fire ant on the households, schools, cities, and golf courses for the aforementioned metroplexes. Other sectors within the urban areas are affected but this study shows the major impacted sectors that interfere with the human activities in living areas, work areas and recreational areas.

Annual expenditures for the management and control of fire ants was selected as an indicator of the annual economic impact. This study found that the annual expenditure for fire ant control and management in these metroplexes amounted to over $581 million.

The total annual expense by sector amounted to $526 million for households, $29 million for golf courses, $25 million for schools, and $0.6 million for cities. These annual cost figures do not include multiple family housing or costs born by electrical utility companies, communication firms and cable companies. These data are available from the Texas Tech University study conducted by E. Segarra, et.al.

The annual costs of control and management of fire ants were distributed by metroplex as follows: $61 million for Austin, $121.5 million for Dallas, $74.9 million for Fort Worth,

$121.9 million for Houston and $202 million for San Antonio.

The costs by expenditure items were as follows: $301.5 million for fire ant control and treatment, $80.6 million for repairs, $152 million for costs of equipment replacement and $47.2 million for medical treatment.

The study also revealed information about location of damaged areas, respondents' valuation of the activities curtailed by fire ants and their willingness to pay for effective fire ant management.

Table of Contents

Acknowledgements ..... **i**

Abstract **2**

Chapter 1: Introduction to the Texas Fire Ant ***7***

Economic Impact Study ***7***

Research Study and Purpose **7**

Study Objectives **7**

Data Collection Methods **8**

The Sampling Process **9**

Chapter 2: Aggregate Results of the Economic Impact Study ***11***

Introduction **11**

Summary of Fire Ant Expenditures for the Metroplexes **11**

Types of Expenditures by Metro Area **12**

Austin 12
Dallas 12
Fort Worth 12
Houston 13
San Antonio 13

Expenditures by Category of Expense or Cost **14**

Chapter 3: The Economic Impact of Fire Ants on Households ***15***

Summary of Results **15**

Objective of Household Study **16**

Description of Metroplex Households **16**

Define Fire Ants as a Problem **16**

Household Labor and Responsibilities for Control of Fire Ants **17**

Fire Ant Information Sources **17**

Magnitude of Fire Ant Problem **17**

Valuation of Curtailed Activities **18**

Household Expenditures by Metroplex **18**

Austin 18
Dallas 19
Fort Worth 21
Houston 22
San Antonio 23

Importance of Fire Ant Control **24**

Conclusion **25**

Weighted Average ***26***

Chapter 4: The Economic Impact of Fire Ants on Golf Courses ***30***

Summary of Results **30**
Objective of Golf Course Study **30**
Description of Golf Courses in the Metroplexes **30**
Definition of Fire Ant Problem **31**
Golf Course Labor for Control of Fire Ants **31**
Fire Ant Information Sources for Fire Ants **32**
Magnitude of Fire Ant Problem **32**
Valuation of Curtailed Activities **32**
Golf Course Expenditure by Metroplex **33**
Austin 33
Dallas 34
Fort Worth 35
Houston 37
San Antonio 38
Importance of Fire Ant Control **40**
Conclusion **40**
Chapter 5: The Economic Impact of Fire Ants on Schools ***46***
Summary of Results **46**
Definition of Problem **46**
Magnitude of Fire Ant Problem **46**
Valuation of Curtailed Activities **47**
Description of School Expenditures **47**
Expenditures for Treatment **48**
Fire Ant Information Sources **49**
Importance of Control and Willingness to Pay **49**
Chapter 6: The Economic Impact of Fire Ants on Cities ***53***
Summary of Results **53**
Description of Metroplexes **53**
Define Fire Ants as a Problem **53**
Valuation of Curtailed Activities **54**
Metroplex Expenditures **54**
Repair costs **55**
Treatment costs **55**
Control costs **55**
Medical costs **56**
Electrical repair and replacement costs **56**

Importance of fire ant control.....57
Summary.....57
References Cited**.....** *Error! Bookmark not defined.*
Appendix**.....*64***

Chapter 1: Introduction to the Texas Fire Ant Economic Impact Study

Research Study and Purpose

This research study was conducted by the Department of Agricultural Economics through the Texas Agricultural Experiment Station (TAES) and the Texas Agricultural Extension Service (TAEX) of the Texas A&M University system. The principal sponsor was the Texas Fire Ant Initiative with the funds from the Texas Department of Agriculture's portion of these state funds.

The purpose of this study was to estimate the total economic impact of the fire ant on selected sectors (homes, schools, city services and golf courses) of the five metroplexes of Texas: Austin, Dallas, Ft. Worth, Houston and San Antonio.

Study Objectives

The specific objectives include:

1. To identify items which are considered expenditures or costs and those items which have value or benefits (if any) associated with the control and management of fire ants.
2. To estimate the cost of various control and management measures used by selected sectors of the urban areas.
3. To discover the various ways and areas where the fire ant affects these selected sectors or the urban space.
4. To estimate various expenditures associated with the fire ant damages.
5. To enhance the usefulness of this study by relating a previous study "The Economic Impact of the Green Industry of Texas."
6. To estimate the overall economic impacts associated with fire ants in the selected metroplexes to serve as a benchmark to evaluate possible control and management programs implemented by the Texas Fire Ant Initiative.

Data developed from this study can be used as a part of the 1999-2001 project to arrive at an overall assessment of fire ant damages statewide.

Data Collection Methods

The data collection phase of the study was done in 1998 and 1999 to obtain costs and benefits associated with the calendar year 1998. The costs, practices and benefits were collected for single-family detached homes (it excludes multifamily residences), schools (public and private schools, including elementary schools, high schools and higher education institutions), cities, and golf courses.

Emphasis was directed toward problems encountered, expenditures associated with damage control, maintenance expenditures and investments, medical expenses, damages to electrical and electronic equipment, as well as related practices and characteristics of these selected sectors (homes, schools, cities and golf courses). The highlights of these findings are presented in the Abstract and in Chapter 2.

The principal types of data needed for this study were primary data. These data were collected from households, schools, cities and golf courses by using carefully structured questionnaires. Questionnaires were administered by mail to schools, cities, and golf courses, with phone call follow-ups. The household survey questionnaires were obtained by personal interviews by trained personnel from the Texas Agricultural Statistical Service (TASS).

The questionnaires were developed, pretested and administered to school administrators, city mayors, and golf course managers. Follow-up phone calls, faxes and mail-outs were made until the required response level was reached.

The research team determined that multiple choice, discussion and fill-in-the-blank questions would provide the desired results in terms of answers as well as responding to the study. This type of questionnaire permitted an easy tabulation of data for the

SPSS® Analysis System.

Secondary data sources used included the Census of Population, Census of Agriculture and the Sales Marketing and Management Survey. These were used in obtaining the weights for the multiplication or expansion factors for the household part of the study. Texas Education Agency data were used for the school expansion factors. The list (directory) of Texas Golf Courses was used to obtain the expansion factors for the golf course sector.

The Sampling Process

The main goal of the sample design for each sector was to obtain a representative sample of the households, schools, and golf courses. All five metro cities were surveyed to obtain city data.

The single-family households (detached homes) were stratified by metroplex and the sampling scheme was based upon the U.S. Agricultural Statistical Service's area frame sampling. TASS was contracted to conduct the sampling and the personal interviews. These area frames were modified with the 1997 Census of Agriculture which indicated non-agricultural areas, primarily residences. These adjustments were necessary because the Area Frame Sample for TASS was designed to obtain data about acreage, yields, numbers, etc. of agricultural products and inputs.

The Economic Impact of the Texas Turfgrass Industry study associated with maintaining turf and green areas in Texas done by Curtis F. Lard and Charles R. Hall include the costs for chemicals, machinery, labor, etc. associated with fire ant management for various sectors of the Texas economy. However, specific costs and expense items were not specifically delineated for fire ants. In order to do this, the fire ant economic impact study was conducted by five sectors of the metroplexes of Dallas, Fort Worth, Austin, San Antonio, and Houston to acertain these data by a survey instrument.

A literature study was made to ascertain what other research was done in Texas as well

as other states which have addressed the economic impact of fire ants. To our knowledge, no other economic research had been done on fire ants that used primary data. However, limited economic impact studies were done by the University of Arkansas and the University of Georgia.

A complete list of frames was used for schools and golf courses in the metroplexes. Sample size was determined by using the usual scientific statistical procedure as follows:

$$n = \frac{z^2 \sigma^2}{e^2}$$

when n = sample size

z = number of standard deviations from the population mean

σ = the population standard deviation

e = the accepted error or desired level of precision

In this study it was decided that an "*e*" of plus or minus 10 percent for the estimated value (sample mean) for fire ant expenditures was acceptable. Also, it was decided that 90 percent of the study's observations should fall within the plus or minus 10 percent of the population mean, our *z* value was based upon this as well. The σ was approximated by use of range tests. The requirements were used to guide the survey of households, schools and golf courses.

Chapter 2: Aggregate Results of the Economic Impact Study

Introduction

The geographic area defined by this study includes the metroplexes of Austin, Dallas, Ft. Worth, Houston and San Antonio (ref.: 1997 Sales, Marketing and Management Survey). The sectors of the metroplexes surveyed were households, golf courses, schools and cities (government services).

The types of data collected for each sector included (1) characteristics of each entity, (2) defining the fire ant problem, (3) identifying types of expenditures for control and management, (4) maintenance expenditures and investments, (5) medical expenditures, (6) damages to electrical type equipment and (7) general information on the sector.

Fire Ants interrupt and diminish the ability of society to participate in outdoor work, leisure, family and community type activities. The damages occur to equipment, facilities, plants, animals and human beings. These damages and/or costs are summarized by the type of expenditure, metroplex and sector in the following sections.

Summary of Fire Ant Expenditures for the Metroplexes

The primary objective of this study was to estimate the economic impacts of fire ant on the metroplexes where people live, work and recreate. The overall cost to these metroplexes for fire ant damages and control was over $581 million for 1998. The expenditures by sector are reported in Table 2.1. The greatest cost was to the household sector with $526 million in damages and control. The per household average was $150.79. The golf course expenditure was $29.49 million or $63,495 per golf course. The expenditures for the school sector were $25.44 million and for cities were $612,453.

Table 2.1 Total Fire Ant Expenditures by Texas Metroplexes by Sector for 1998

Sector	**Total Expenditures for Fire Ant Control and Damages**
Households	$525,882,656
Golf Courses	$29,487,659
Schools	$25,441,524
Cities	$612,453
Total	**$581,424,292**

If the costs and damages to all residential households, businesses, churches, institutions, cemeteries, airports and others affected by fire ants were added to this total the aggregate annual costs would be much greater.

Types of Expenditures by Metro Area

Austin

The 1998 expenditures for fire ant treatment and damages by sector for the city of Austin are reported in Table 2.2. Total expenditures for Austin were $61.03 million. This included $ 14.185 million for golf courses, $ 1.014 million for schools, $ 51,599 for city services, and $45.783 million for households.

Dallas

The 1998 expenditures for fire ant treatment and damages by sector for the city of Dallas are reported in Table 2.2. Total expenditures for Dallas were $ 121.485 million. This included $ 10.010 million for golf courses, $ 11.934 million for schools, $ 194,523 for city services, and $99.346 million for households.

Fort Worth

The 1998 expenditures for fire ant treatment and damages by sector for the city of Fort Worth are reported in Table 2.2. Total expenditures for Fort Worth were $ 74.881 million. This included $ 1.177 million for golf courses, $ 1.312 million for schools,

$326,754 for city services, and $72.065 million for households.

Houston

The 1998 expenditures for fire ant treatment and damages by sector for the city of Houston are reported in Table 2.2. Total expenditures for Houston were $ 121.893 million. This included $ 3.538 million for golf courses, $ 7.271 million for schools, $28,860 for city services, and $111.055 million for households.

San Antonio

The 1998 expenditures for fire ant treatment and damages by sector for the city of San Antonio are reported in Table 2.2. Total expenditures for San Antonio were $ 202.131. This included $ 577.992 million for golf courses, $ 3.910 million for schools, $10,716 for city services, and $197.632 million for households.

Table 2.2 Total Expenditures for fire ant by Metro Area for 1998

Sector	**Metro Area**					**Total**
	Austin	**Dallas**	**Ft. Worth**	**Houston**	**San Antonio**	
Households	$45,783,120	$99,346,358	$72,065,323	$111,055,396	$197,632,458	$525,882,656
Golf Courses	$14,185,158	$10,009,844	$1,177,055	$3,537,610	$577,992	$29,487,659
Schools	$1,014,431	$11,933,903	$1,311,722	$7,271,224	$3,910,193	$25,441,524
Cities	$51,559	$194,523	$326,754	$28,860	$10,716	$612,453
Total	$61,034,309	$121,484,628	$74,880,905	$121,893,090	$202,131,359	$581,424,292

Expenditures by Category of Expense or Cost

Table 2.3 Total Expenditures by Type of Expense by Sector for 1998

Category of Expense	Metro Area					Total
	Austin	Dallas	Ft. Worth	Houston	San Antonio	
Treatment Costs	$22,960,163	$98,240,765	$37,571,769	$73,560,495	$69,218,857	$301,552,049
Repair Costs	$2,828,744	$8,133,426	$34,028,954	$10,087,244	$25,548,194	$80,626,562
Replacement Costs	$32,028,966	$11,177,899	$1,000,952	$1,583,623	$106,288,348	$152,079,788
Medical Costs	$3,216,437	$3,932,538	$2,279,230	$36,661,728	$1,075,960	$47,165,893
Total	$61,034,309	$121,484,628	$74,880,905	$121,893,090	$202,131,359	$581,424,292

Chapter 3: The Economic Impact of Fire Ants on Households

Summary of Results

Fire ant related expenditures on treatment, repair, replacement, and medical costs over the 5 large metroplexes in Texas[1] were $150.79 per household, leading to total metroplex expenditures of $525.88 million. Clearly, fire ants have a considerable impact on these metroplex households. Treatment costs, which include pesticides, baits, and other control measures for the metroplexes are $279.63 million, making up a significant portion of the expenditures. Repair costs account for $72.77 million and replacement costs are $126.43 million for the five-metroplex household totals. Total annual metroplex expenditures for medical care costs are $47.05 million. For a comparison between per household figures and per metroplex figures see table 3.1.

The Austin metroplex household expenditures contribute $45.8 million to the total metro area expenditure. Treatment costs in Austin are $21.6 million, repair costs are $2.5 million, replacement costs are $18.5 million and $3.2 million for medical care for fire ants. Metroplex household expenditures in Dallas contribute $99.3 million. The treatment costs for Dallas households are $90.2 million, $3.6 million for repair costs, $1.6 million for replacement costs, and $3.9 million for medical costs. The Fort Worth metroplex expenditures are $72.07million. Treatment costs are $36.62 million in the Fort Worth metroplex, repair costs are $33.23 million and $2.22 million for medical costs. The Houston metroplex expenditures are $111.1 million. The Houston metroplex treatment costs are $65.1 million, repair costs are $9.3 million and medical care costs are $36.7 million for households. Metroplex expenditures for fire ants in San Antonio are $197.63 million. Households in San Antonio spent $66.05 million on fire ant treatments, $24.22 million on repair costs, $106.28 million for replacement costs and $1.08 million on medical care costs in 1998. See figure 3.2 for a metroplex expenditure comparison.

[1] The 5 large metroplexes are: Austin, Dallas, Fort Worth, Houston, and San Antonio

Objective of Household Study

The main objective of this study was to determine the annual level of household expenditures on fire ant control, repairs to equipment and damage areas, and replacement of equipment in the five large metroplexes of the State of Texas. The survey results indicate the extent to which fire ants are a problem, the areas typically damaged by fire ants and associated costs, household expenditures for treatment measures, household expenditures on repairs, and household expenditures and investment for electrical equipment and other major equipment because of fire ant damage.

Description of Metroplex Households

In the metroplexes surveyed, most households own the property where they reside. The average lot size was about .6916 acres.[2] Of that area, most was comprised of a grass lawn (61.33%). A portion of the lot was designated for swimming pool area (16.8%), landscape area (20.98%), and hardscape area (17.61%). A smaller portion of the average lot was made up of garden area (11.19%). Most homes surveyed are less than 20 years old and are bordered by neighbor's homesites, streets and alleyways.

Define Fire Ants as a Problem

Most of the households (58.91%) reported that fire ants are "somewhat of a problem" around their residence. Some (31.28%) households report fire ants as "not a problem" and 9.77% of households report fire ants as a "serious problem" (see figure 2). The responses have shown that fire ants are a seasonal problem occurring between April and September in an average year. About 67% of households said they have 5 or fewer mounds in their yard. See figure 3.3.

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[2] The average lot size was slightly inflated due to the San Antonio average of 1.12 acres, which seems high relative to the other metroplex averages: .556 acres for Austin, .3776 acres for Dallas, .3096 acres for Fort Worth, and .4544 acres for Houston.

Household Labor and Responsibilities for Control of Fire Ants

Having confirmed that fire ants are a problem for Texas households surveyed, it was important to know who in the household was responsible for fire ant control. On average, the family male adult (70.30%) and family female adult (32.02%) are responsible for the control of fire ants. Fewer households (2.56%) use pest control operators.[3] See figure 3.4.

Fire Ant Information Sources

Households obtain information about fire ants from a wide array of sources. Over the five metroplexes, neighborhood associations, county extension agents, entomologists, community education classes, media, university specialists, chemical companies, pest control companies, home and garden centers, and other sources were noted. However, most (52.9%) responded that the media (radio/television) was where they find information about fire ants. A notable number of households responded that pest control companies (12.3%), home and garden centers (21.4%), and other sources (40.5%) provided their information. The other sources include friends, family, newspapers, local stores, libraries and the internet. See figure 3.5.

Magnitude of Fire Ant Problem

Problem areas for households in the surveyed metroplexes were landscape areas, hardscape areas, yard areas, and gardens. Even though fire ants are a problem for households, most (73.2%) responded that fire ants do not restrict members of their households from doing activities in their yards or gardens. Of those who confirmed that fire ants restrict activities, they noted gardening, swimming, sunbathing, landscaping, picnicking and children playing in the yard as the activities that they had curtailed because of fire ants.

[3] Respondents indicated more than one person responsible for labor in the household, so the percentages shown indicate the share of the sample using that resource and the total is greater than 100%.

Valuation of Curtailed Activities

Those who responded that they indeed had to stop or limit some activities because of fire ants gave some insight into how much each activity was worth in dollar terms. Of those who responded, picnicking was "worth" to them the most ($60.92), gardening ($23.11) and sunbathing ($42.70) had significant costs as well. Respondents indicated that swimming, landscaping, and children playing were worth $1.89, $6.33, and $5.32 respectively. Thus, we see that fire ants cause households to limit or stop doing some activities and the value of those activities was around $140.27 for all activities curtailed, per household reporting.

Household Expenditures by Metroplex

Austin

The Austin metroplex showed significant ($45,783,120) expenditures due to fire ants. In the categories of expenditures, repair, treatment, medical and replacement, each household in Austin had notable costs, on average ($145.39). See table 3.1.

Households in Austin reported repair and treatment costs for outside damage areas in gardens, outside electric equipment and other equipment. In general, contract employees did repairs to garden areas about 15 times per year. The owner of the household did repairs to outside electrical equipment about 2 times in a year. Costs per household for garden repairs were $2.87, for outside electric equipment $1.42, and other equipment $.38. Professional contractors and household owners did the treatment to these areas. Types of treatment for these areas include sprays. Treatment was done about 15 times per year for gardens, 14.5 times per year for outside electric equipment and 32 times per year for other equipment. Treatment costs for gardens was $1.34, for outside electric equipment $.36, and other equipment $.85.

Austin households spent $35.55 on materials to control fire ants. The majority ($27.65) was spent on insecticide mound treatments. Households also use insecticide baits, organic remedies and other materials for treatment of fire ants. The total cost of

equipment was $2.22. Sprayers, spreaders and other miscellaneous equipment are used in the treatment of fire ants. Supplies to control fire ants include gloves and other supplies. The total cost of supplies was $.63 per household in Austin. Professional services and other services costs are significant ($27.68) for Austin households.

Medical care costs for households in Austin include treatments for children, adults and animals. Generally, duration of injury because of fire ants was 5.6 days for children, 4.5 days for adults, and about 6 days for animals. Treatment for animals included veterinarian treatment with injections. Cost of medical care in Austin households was $3.36 for children, $3.38 for adults, and $3.30 for animals, per household.

Damage to electrical equipment because of fire ants, in the Austin metroplex, includes air conditioning and telephone wiring damage. Replacement cost per household for air conditioning was $58.82. The repair cost for damages of air conditioning units by fire ants was $3.14. The households reported that repair work done to the telephone wiring systems was done by the telephone company. The cost for repairs to the homeowner for telephone wiring in Austin households was $.10.

Dallas

The Dallas metroplex had expenditures of $99,346,358 due to fire ants. Households in Dallas had notable costs ($70.94) in the repair, treatment, medical and equipment replacement areas. See table 3.1.

The responses from Dallas households indicated that damaged areas include gardens, landscape, hardscape, children's play areas, inside homes, outside electric equipment and other equipment. Repairs to landscape and outside electrical equipment areas are done by the owners of the homesite. Repairs are done on landscape areas one time per year, 27 times per year for hardscape areas, and four times per year for outside electric equipment. The costs for repairs per household for landscape areas was $.17, $.42 for outside electrical equipment and $.34 for other equipment. Treatment for these areas was done by the homesite owner, professional services, and paid employees.

Generally, granules, powder, insecticide, and amdro were used for treatment in these areas. Treatment was done 52 times per year for gardens, 32.5 times per year for landscape areas, 22 times per year for children play areas, and 2.5, 1 and 2 times per year for inside homes, outside electric equipment, and other equipment respectively. The costs for treatment for garden areas was $.21, $.51 for landscape areas, $.51 for hardscape areas, $1.99 for children play areas, $8.56 for inside the house, $.08 for outside electric equipment, and $1.85 for other equipment.

Dallas households spend considerable amounts of money on materials, equipment, supplies, and professional services for treatment of fire ants. They spend $23.89 on material costs. The materials consist of insecticide mound treatments, insecticide baits and other materials. The annual cost of equipment per household in Dallas was $3.00. Most ($2.58) of that figure was spent on sprayers with $.42 spent on spreaders. Total cost of supplies used for fire ants per household was $1.50. The supplies used by households in Dallas were gloves and repellent sprays. The cost for professional services was $22.34 per household. These costs were for lawn maintenance companies, pest control companies, and other services.

The medical costs for Dallas households consisted of treatment expenses for children, adults and animals. The duration of injury for children was 4 days, 16.88 days for adults and 4 days for dogs, per year. Generally, 2 days of school were missed per year because of fire ant injuries for children. Treatments for humans include antiseptics, alcohol, lotion, neosporin ointment, benadryl, betadine and antibiotics. No treatments for animals were noted. The cost of treatment for children was $.72 and $2.08 for adults, per household.

Dallas households had damage to television cable systems, air conditioning units, telephone wiring systems, water well pumps and other electrical equipment. The replacement costs for telephone wiring systems was $.09 and for other equipment the cost was $1.07. The cost per household for cable system repair was $.45, for telephone wiring systems $.09 and for other equipment $1.07. The repair work to the

television cable systems was done by the cable company in Dallas and by the home resident for air conditioning repair, telephone wiring repair and water well pump repair.

Fort Worth

In the Fort Worth metroplex, expenditures on repair, treatment, medical and equipment costs were substantial at $72,065,323. Households had outlays averaging $124.92, in these four categories. See table 3.1.

Households in the Fort Worth metroplex noted landscape areas and inside homes as areas that had been damaged by fire ants. Repairs done inside homes were performed by the owner of the homesite about 1 time per year. Costs to repair the landscape for a household were $.15, and $51.09 for inside the home. Treatment costs due to fire ants inside a home were $.54, per household. Generally, fire ants are treated two times per year and the treatment took about half an hour to complete.

Treatment costs on materials, equipment, supplies and professional services in the Fort Worth metroplex were significant. The total cost of materials for fire ants was $35.29 per household. The majority of that cost ($22.35) was spent on insecticide mound treatment, while $3.63 was spent on insecticide baits, $.41 on mechanical disturbance, $5.10 on organic materials and $3.80 on other materials for fire ant treatment. Total equipment cost was $5.00 and it was divided almost evenly between sprayers and spreaders. Households spend $.84 on supplies including gloves and repellent sprays. A considerable amount ($21.80) was spent, per household, on professional services for treatment of fire ants in the Fort Worth metroplex.

Medical care for children and adults because of fire ant stings was notable. The duration of injury for children was 3 days and 7 days for adults. Children missed on average 3 days of school and adults missed 7 days of work because of injury due to fire ants. Medical treatment for adults included zoviax. The cost of medical care for children was $.89 and $2.96 for adults, per household.

Air conditioning repair costs were the only electrical equipment damage reported by those surveyed in the Fort Worth metroplex. The cost to repair the air conditioning damage caused by fire ants was $6.36 per household.

Houston

The Houston metroplex had total costs to control the fire ant of $111,055,395.72 in 1998. In the categories of expenditures, repair, treatment, medical and replacement, Houston households each had costs of $77.12. See table 3.1.

The damage areas reported in the Houston metroplex include landscape, hardscape, and other areas. Treatment to these areas was done by the owner of the homesite or maintenance personnel. Usually, amdro, granules, gasoline or oil was used to treat the damaged areas for fire ants. Landscape areas were treated 26 times per year for the households that responded. Hardscape areas are treated 4 times per year and other areas are treated 11.17 times per year for Houston households that responded. On average, households spend 3 hours treating landscape areas, less than 45 minutes treating hardscape areas, and about 1.3 hours treating other damage areas. Cost of treatment per household for landscape areas was $.87. For hardscape areas the cost was $.15 and $.96 for other areas per household in the Houston metroplex.

Households in Houston spent notable amounts of money on materials, equipment, supplies and professional services for treatment of fire ants. Houston households reported considerable costs of $22.11 for materials to treat fire ants. Insecticide mound treatments account for $14.21 of expenditures for materials and less than $8.00 total for insecticide baits, organic remedies, and other costs. Each household spent $5.79 on sprayers and spreaders to treat fire ants. Total supply costs per household were $.90, with $.70 allocated for gloves and $.20 for repellent sprays. Professional services expenditures include $6.86 for lawn maintenance companies and $5.10 for professional pest control services to control fire ants, per year. Other costs for treatment of fire ants in Houston were $5.77, per household.

Houston households reported medical treatments for children and adults. Duration of injury for children was 6.6 days and 5.6 days for adults. On average, children missed 1 day of school and adults missed 7 days of work because of fire ant injury. Alcohol, benadryl, sting pads and ointment were used to treat fire ant bites. Costs of treatment for children in Houston households were $1.44 and $24.01 for adults, per household.

Damage to television cable systems and air conditioning units was reported by Houston households surveyed. Repair work for those who reported television cable system damage was done by the homeowner. Air conditioning repairs were done by professional services. The cost to repair the cable system damage was $.60 per household and $4.76 for repair of air conditioning damage.

San Antonio

The San Antonio metroplex had significant ($197,632,458) expenditures because of fire ants. Households in San Antonio spent $250.26, on average, in order to control fire ants in the repair, treatment, medical, and equipment replacement areas. See table 3.1.

Households in San Antonio reported gardens, landscape areas, hardscape areas, inside homes, outside electric equipment, and other equipment as damaged areas. The owner of the household repaired the garden about 12 times per year. Hardscape areas and outside electric equipment were repaired 1 time per year by the homeowner. Repairs inside homes were done by the homeowner. Repairs to other equipment were done 12 times per year by the homeowner. Cost per household to repair garden areas was $7.93 and $1.72 for damage repairs inside homes. Repair cost for outside electric equipment was $.69 and $3.45 for other equipment in the San Antonio metroplex. Areas treated for fire ants by households in the San Antonio metroplex were gardens, landscape areas, hardscape areas and inside homes. Generally, the owner of the home did the treatment to the areas with amdro, orocom, orthene, gasoline, bait and diazinon. Garden and landscape areas are treated 8 times and 4 times per year respectively. The time spent treating was 2.25 hours for gardens, 1.19 hours for landscape areas, and 2.6 hours for treatment inside the home.

San Antonio households spent sizable amounts of money on materials, equipment, supplies and professional services for treatment of fire ants. The total cost of materials was $41.09 per household. The greatest portion, $28.24, of that total was spent on insecticide mound treatment, while households also purchased baits, mechanical disturbance tools, organic remedies, and other materials to control fire ants. Equipment expenditures for San Antonio households were $9.69. Households spent $4.22 on sprayers and $5.47 on spreaders. The total cost of supplies was $4.38. Households purchased gloves, repellent sprays and other supplies to control fire ants. The cost for professional services was $9.03. These costs are for lawn maintenance companies and professional pest control companies to treat fire ants.

Medical care for San Antonio households included treatment for children, adults and animals. The duration of injury due to fire ants was 5 days for children, 4.9 days for adults and 1 day for animals. The treatment for children and adults consisted of alcohol, benadryl, calamine lotion and asthma treatment medications. Animal treatment included medicated shampoos. The cost per household for treatment of children was $.16 and $1.17 for adults. Households spent $.03 for treatment to animals.

San Antonio households reported damage to air conditioning units, irrigation systems, water well pumps, and other outside electrical equipment. Replacement costs for households for air-conditioning units was $83.33 per household. Replacement costs for irrigation systems and water well pumps was $4.79 and $41.67 for other outside electrical equipment. The repair costs for air conditioning units was $2.08 per household, $4.79 for irrigation systems and water well pumps, and $5.21 for other outside electrical equipment. The repair work for air conditioning units was done by professional services. The homeowner repaired irrigation systems, water well pumps and other outside electrical equipment.

Importance of Fire Ant Control

Given the expenses for households to treat fire ants at their homesite, it was not

surprising that households in the metroplexes surveyed responded that it was important to control fire ants (88.08%). Texas metro area residents stated they were willing to spend, on average, $89.47 each year to control fire ants.

Conclusion

Households in the Texas metroplexes surveyed reported that fire ants are somewhat of a problem for them. Generally, the adult male and adult female are responsible for control of fire ants around the homesite. Households reported they have many different sources for information about fire ants. Households reported various problem areas, but fire ants generally did not restrict members of households from doing activities in the problem areas. On average, each household in the surveyed metroplexes spent $150.79 for treatment, repair, replacement and medical care costs for fire ants, per year. The overall annual expenditure to manage and control fire ants across the 5 metroplexes was $525.9 million for 1998.

Table 3.1 Household Expenditures by Metro and Type

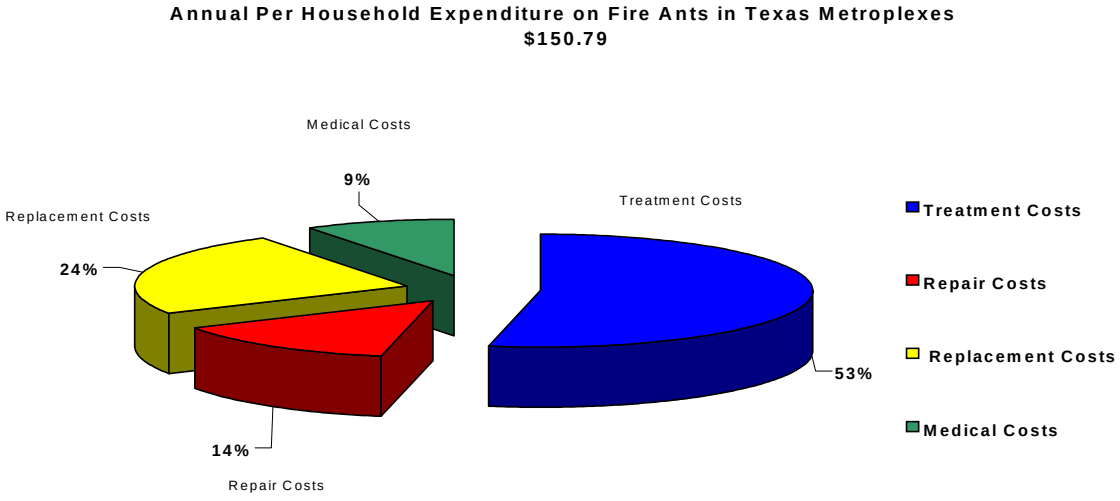
Total Per Household Expenditures

Type of Cost	*Austin*	*Dallas*	*Fort Worth*	*Houston*	*San Antonio*		Weighted Average
Repair	$ 7.90	$ 2.54	$ 57.60	$ 6.44	$ 30.67	**$**	**19.24**
Treatment	$ 68.62	$64.44	$ 63.47	$45.21	$ 83.64	**$**	**66.34**
Medical	$ 10.05	$ 2.80	$ 3.85	$25.46	$ 1.36	**$**	**9.48**
Replacement	$ 58.82	$ 1.16	$ -	$ -	$134.58	**$**	**55.73**
Total per Household	*$145.39*	*$70.94*	*$124.92*	*$77.11*	*$250.25*		
					Total per Household	**$**	**150.79**

Total Per Metro Expenditures

Type of Cost	*Austin*	*Dallas*	*Fort Worth*	*Houston*	*San Antonio*	**Total Expenditures**
Repair	$2,486,421.81	$3,556,093.84	$33,230,810.37	$9,280,252.35	$24,219,186.25	**$ 72,772,764.63**
Treatment	$21,609,233.16	$90,237,950.98	$36,616,138.10	$65,114,263.53	$66,054,595.01	**$ 279,632,180.78**
Medical	$3,163,378.21	$3,926,852.01	$2,218,374.85	$36,660,879.84	$1,075,651.84	**$ 47,045,136.75**
Replacement	$18,524,087.14	$1,625,461.25	$ -	$ -	$106,283,025.35	**$ 126,432,573.74**
Total per Household	*$45,783,120.32*	*$99,346,358.08*	*$72,065,323.33*	*$111,055,395.72*	*$197,632,458.45*	
					Total per Metroplex	**$ 525,882,655.90**

Figure 3.1 Percentage of Household Expenditure by Category



Metro Areas Surveyed include: Austin, Dallas, Fort Worth, Houston, San Antonio
Source: The Economic Impact of Fire Ants on Texas Metroplexes Team

Figure 3.2 Total Household Expenditure on Fire Ants in Metro Areas

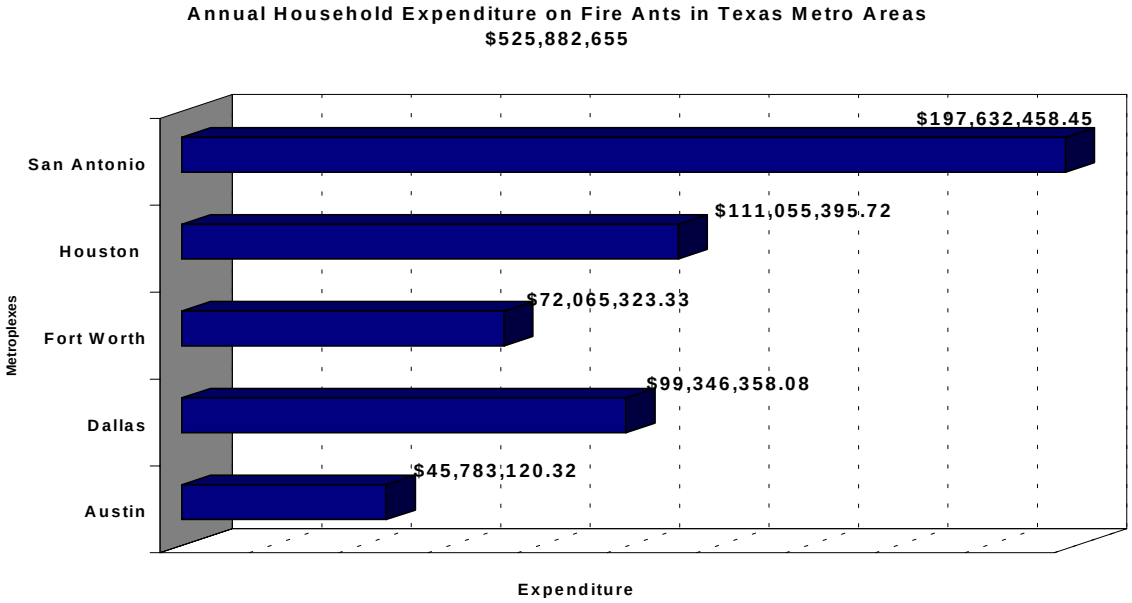


Figure 3.3 Fire Ant Problem by Category, Households

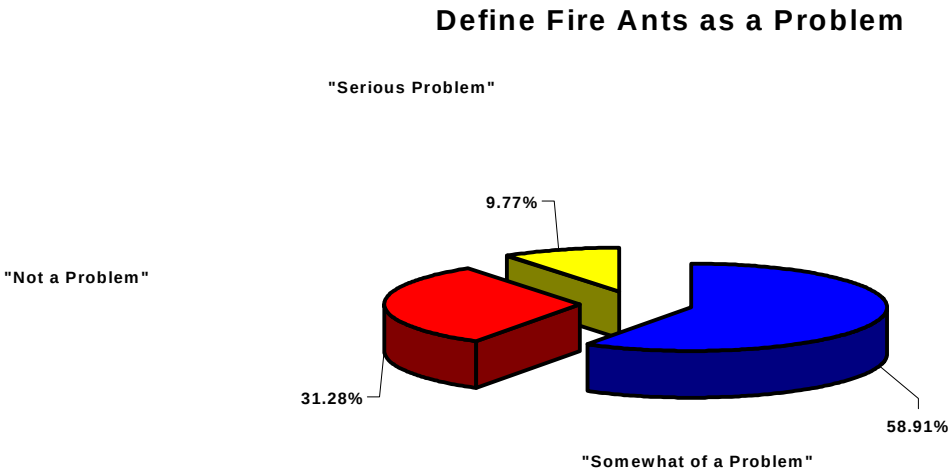


Figure 3.4 Household Labor Responsibilities

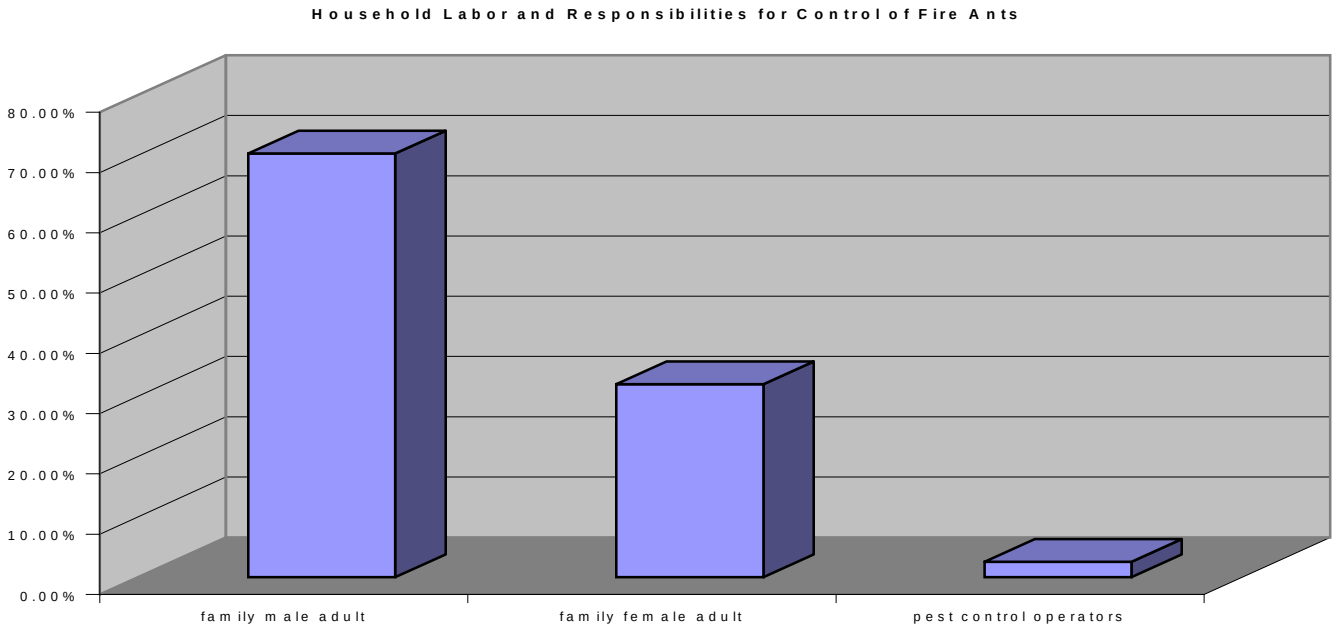


Figure 3.5 Information Sources on Fire Ants for Households

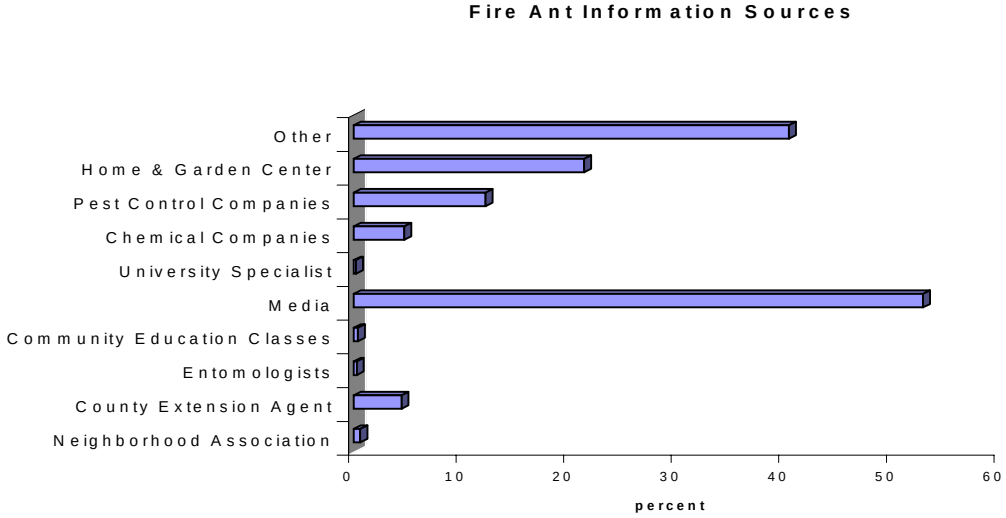
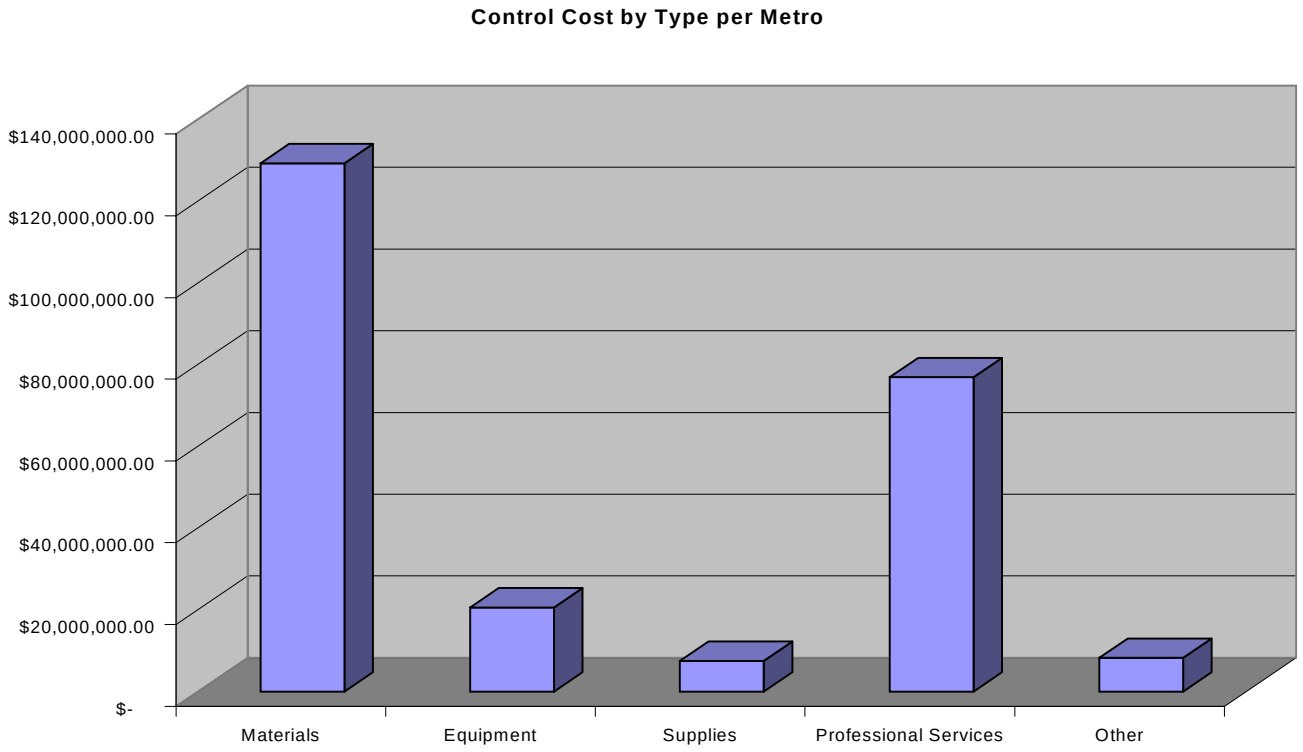


Figure 3.6 Household Control Cost by Category



Chapter 4: The Economic Impact of Fire Ants on Golf Courses

Summary of Results

Fire ants have made a large economic impact on the golf courses of the five large metroplexes of Texas. The fire ant expenditures on treatment, repair, replacement, and medical costs over the five large metroplexes in Texas was $64,494.90 per golf course. When looking at each of the four above expenditure categories for the golf courses relating to fire ants, replacement cost was the most significant of the metroplexes total expenditure. Replacement expenditure was $25.24 million. A considerable proportion was for the costly replacement of irrigation systems due to fire ant habitation in the system. Treatment costs, which included mostly insecticide baits followed by individual mound treatment performed by the golf course management, had an expenditure across the metroplexes of $3.10 million. Repair costs account for both electrical equipment and physical damage to the different areas of the course, and was $1.15 million. Annual metroplex expenditures for medical care costs were $3,610.13. For a comparison between per golf course expenditure figures and per metroplex expenditure figures see Table 4.1.

Objective of Golf Course Study

The objective for the golf course sector was to determine the level of expenditure for golf courses in the five large metroplexes of Texas in the expenditure categories of treatment, repair, replacement, and medical care due to fire ants. The mail-out format questionnaire showed the extent to which golf courses were spending annually to treat the golf course, repair damaged areas in both electrical and golf course area, treatment costs for medical care, and replacement of electrical equipment.

Description of Golf Courses in the Metroplexes

Of the metroplexes surveyed, most of the golf courses were 18-hole public golf courses with an average age of 34.56 years. With this average age, it can be concluded the fire ant activity was somewhat limited because fire ants thrive on newly established areas.

The average size of the golf courses was 164.14 grass acres. Clubhouses had an average size of 17,789.08 square feet. The number of acres around the course constituting the hardscape portion of the golf course was 44.18. Swimming pool area was 106,677.2 square feet on average.

Definition of Fire Ant Problem

Most of the golf courses (72%) defined fire ants on the golf course as "somewhat of a problem." Only 7% of the sample said fire ants were not a problem. Furthermore, 21% reported that fire ants were indeed a serious problem for the golf course. The golf courses reported that the most fire ant activity leading to problems on the course occurred from April to September. This response showed that fire ants were a seasonal problem from the rainy season of the year to the hot and dry portion of the Texas weather. Across the metroplexes, 74% responded heavy fire ant activity from April to June. Similarly, 71%[4] reported fire ant activity from July to September.

Golf Course Labor for Control of Fire Ants

Since the five large metros in Texas confirmed that fire ants were a problem on golf courses, it was important to consider who was having to provide labor time due to fire ant habitation on and around the golf course. The internal golf course maintenance provided most of the labor for controlling fire ants, instead of contacting outside sources for control. The four areas constituting most of the damage were landscape areas (51%), fairways (48%), tees (48%), and electrical equipment (59%). The internal personnel for the golf course maintenance provided the labor to repair and treat the damaged areas caused by fire ants.

[4] Respondents indicated more than one time of year for problems with fire ants, so the percentages shown indicate the share of the sample using that resource and the total is greater than 100%.

Fire Ant Information Sources for Fire Ants

Over the five large metroplexes of Texas, the golf courses stated they had searched and received information from a variety of respectable sources to deal with the fire ant activity on their golf course. The sources included: County Extension Agents (46%), Entomologists (15%), Conferences (49%), Media (28%), University Specialists (42%), Lawn Maintenance Companies (4%), Pest Control Companies (11%), and Chemical Companies (54%). These statistics showed that Chemical Companies were an important resource for golf courses dealing with fire ant activity. Other sources for information mentioned included golf course associations, past experience, personal knowledge, staff, and customers.

Magnitude of Fire Ant Problem

As noted earlier the problem areas on and around the golf course were electrical equipment (59%), landscape areas (51%), fairways (48%), tees (48%), and roughs (42%). Electrical equipment was a very serious concern for the golf courses in these metroplexes due to fire ant activity in the irrigation systems. Even though fire ants were somewhat of a problem for the golf courses, most (78%) responded that fire ants did not restrict individuals from participating in activities on or around the golf course. Of those who responded, 22% noted that fire ants restricted and limited the golfers and landscape personnel from doing their daily activities.

Valuation of Curtailed Activities

Those who responded that fire ants curtailed activities estimated how much the activity was worth in dollar terms. Of those who responded, golfing activity was “worth” the most ($181.52) followed by landscape personnel activities ($103.82), clubhouse activities ($85.25), swimming ($46.37), and other activities not specified ($38.64). To summarize, golf courses would pay a certain dollar amount to be able to do certain activities without fire ants restricting the activities.

Golf Course Expenditure by Metroplex

Austin

Golf courses in the Austin metroplex responded with a significant expenditure of $14,185,158.22 because of fire ants. With a division of categories into electrical and course area damage repair, replacement of electrical equipment, treatment and control of fire ants, and medical care due to fire ant bites, each golf course in Austin has notable expenditures, on average ($159,185.40). See Table 4.1.

Golf courses in Austin reported that fire ants caused significant damage to certain areas of the course, which resulted in costly repairs and treatment expenditures. In most courses, these damaged areas were repaired by internal maintenance. In general, the golf courses in Austin responded that tees were the most costly repair expenditure ($293.33). Clubhouse, landscape areas, and roughs costs each golf course in Austin $110.00, $163.33, $190.00, respectively. These courses reported having to repair their swimming pools the most often at 365 times a year followed by the greens and landscaping areas at 183.5 and19.33 times a year respectively. Similarly, the golf course internal maintenance did most of the treatment to the damaged areas of the golf courses in Austin. The other significant individual who performed treatment measures was a Spray Technician. Treatments used for these damaged areas included mostly insecticide baits and mound treatments. The greens had to be treated the most at 4 times a year, followed by landscape areas and tees at 3.33 and 3.33 times a year, respectively. Tees were the most expensive to treat at $367.33 followed by fairways at $318.00 and hardscape ($303.33). Landscape areas, tees, and fairways took the most time to treat at 71.33 hours, 33.75 hours, and 26 hours respectively.

Austin golf courses expended a significant amount to control fire ants. Golf courses spent the most on materials ($2,681.00) to control fire ants. The golf courses mostly used insecticide baits followed by individual mound treatments ($671.00). The majority of the expenditure for materials was for baits ($1,090.00). Golf courses used biologicals ($170.00) and other materials ($750.00) not specified to control fire ants. Furthermore

in Austin, golf courses spent $90.00 on equipment to control fire ants. Austin reported using sprayers ($10.00) and spreaders ($80.00) to treat affected areas. The total cost of supplies for fire ant control was $288.50 for golf courses in Austin. The golf courses spent the most on repellant sprays ($197.00) and special shoes ($21.50). Other supplies included gloves and miscellaneous supplies. Since the golf courses reported using their own internal maintenance, professional services were not significant. Austin spent $522.22 for professional services which included professional pest control operators ($77.78) and their own internal maintenance ($444.44).

Austin reported minimal expenditure for medical care. In particular, Austin only reported medical care for course personnel. Golf courses spent $10.00 and used a First Aid Kit for medical care treatment.

Damage to electrical equipment in Austin golf courses was significant. Austin reported the most damage frequency (60%) to their irrigation systems followed by damage to circuit boxes (20%). Austin also reported minimal damage to television cables, air conditions, telephone wires, outdoor lighting, and other miscellaneous electrical equipment. Replacement cost per golf course for their irrigation systems were $150,023.50. This amount was a very significant expenditure for a golf course to spend to replace their irrigation system. On average each golf course in Austin was spending $293.50 to repair their irrigation systems on a yearly basis. Austin reported that course personnel and irrigation technicians repaired the damage to electrical equipment caused by fire ants.

Dallas

The Dallas metroplex had expenditures of $10,009,843.95 due to fire ants. Each golf course in Dallas spent $102,141.26 a year for treatment and repairs of damaged areas to the course, fire ant control, and repair and replacement of electrical equipment due to fire ants. Dallas did not report any expenditure for medical care. See Table 4.1.

The responses from Dallas reported that fairways, electrical equipment, tees, and landscape areas were the most frequently damaged areas in need of repair. The golf course maintenance and spray technicians made most of the repairs. Dallas golf courses reported that greens were repaired 12 times per year and electrical equipment was repaired 5 times a year. The most significant expenditures for repair of damaged areas because of fire ants were tees $162.50, landscape areas $162.50, clubhouse $137.50, and roughs $131.25. Treatment measures for the golf courses damaged areas were performed by the golf course internal maintenance and gardeners. Mostly, the golf courses used baits and mound treatments. Treatment was performed 5 times a year around the clubhouse, 4.33 times for the roughs and 3 times a year for the landscape areas. Dallas golf courses reported spending the most for treatment of the fairways ($1,213.13). Golf courses also reported significant expenditure for treatment of roughs ($457.29) and hardscape areas ($379.17). The most hourly time spent for treating was performed on the fairways (37).

Dallas golf courses spent the most on materials ($2,337.50) as control measures for fire ants. The golf courses used baits ($1,100.00) followed by individual mound treatments ($1,175.00). Organic materials were also used ($62.50) to control fire ants. Each golf course in Dallas spent $131.43 for spreader equipment to control fire ants. The supplies expenditures included gloves ($50.00), repellant sprays ($42.86), and protective clothing ($28.57) with no expenditure for professional services.

Dallas golf courses reported damage to electrical equipment in their irrigation systems (88%). The replacement costs for their irrigation systems was $93,981.25. It cost Dallas $666.25 on average each year to repair their irrigation systems due to fire ant activity.

Fort Worth

In the Fort Worth metroplex, expenditures for treatment and repair of damaged areas, control measures, medical care, and electrical equipment cost golf courses was

$1,177,055.46. The per golf course outlay in Fort Worth was $14,193.94. See Table 4.1.

Fort Worth golf courses reported the most damage to roughs, electrical equipment, landscape areas, fairways, and tees. Repairs were done by the golf course internal maintenance. Fort Worth reported that the roughs had to be repaired 8 times a year and electrical equipment 27.75 times per year. The most repair expenditure was for roughs ($55.00), tees ($53.33), and landscape areas ($53.33). They also reported repair costs for greens, fairways, clubhouse, and swimming pools. To treat the damaged areas, Fort Worth golf courses again used their internal golf course maintenance. Treatment measures included insecticide baits, individual mound treatments, and pesticides. The landscape areas, swimming pools, and clubhouse areas had to be treated the most at 10 times per year. The roughs were the most costly to repair at $270.00 followed by fairways ($165.00) and tees ($65.00). Total treatment cost per golf course was $720.12. Greens, electrical equipment, roughs, and clubhouse comprised the greatest hourly time to treat at 20, 19.33, 15.67, 15, respectively.

Control expenditures for Fort Worth were limited to materials, equipment, and supplies. The majority of the cost for control measures was spent for materials to control fire ants. The courses reported using insecticide baits ($478.18) followed by individual mound treatment ($445.46). Fort Worth golf courses also responded to using organic materials ($36.36) and other miscellaneous materials ($81.82). One golf course reported using a box of grits as a material for control. Furthermore, Fort Worth only spent $33.33 for spreaders as equipment to control the fire ants. An expenditure of $5 for protective clothing was also reported. Professional services were not reported as a control measure in Fort Worth.

Medical care for children, golfers, and course personnel was notable. The duration of injury for the golfers was 0.10 of a day. Thorough cleaning and lotion was applied to the children, golfers, and course personnel. The cost of medical care for the children and golfers was $7.14. Medical care expenditure for the course personnel was $4.55.

Irrigation systems (73%), circuit boxes (9%), and other miscellaneous electrical equipment (9%) were reported in Fort Worth as damaged because of fire ants. Replacement expenditure for irrigation systems was $11,244.44, and circuit box replacement was $111.11. Labor to repair the damaged electrical equipment was course personnel, staff, manager, and distributor. Expenditure to repair the irrigation systems was $282.22, circuit boxes $1.11, and other miscellaneous equipment $55.56.

Houston

The Houston Metroplex had a total expenditure of $3,537,609.99. The per golf course expenditure for treatment and repairs to damaged areas, control measures, medical care, and electrical equipment damage due to fire ants was $26,800.08. See Table 4.1.

Houston reported having significant damage to their golf courses. The most damage was reported to the greens, landscape areas, clubhouse area, and swimming pools. The golf courses also had damage to their fairways, tees, hardscape, roughs, electrical equipment, and other miscellaneous damaged areas. Swimming pools were repaired 5 times a year and the miscellaneous damaged area once a year. The golf course maintenance and engineers repaired damaged areas. Houston golf courses spent the most to repair damage to the clubhouse area ($355.56). Other reported repair expenditures were greens ($152.78), landscape area ($240.74), fairways ($44.44), tees ($192.59), roughs ($155.56), and swimming pools ($35.56). Total repair expenditure for Houston golf courses was $1,963.28. Treatment to the damaged areas was done by the golf course maintenance and pest control companies. Treatment included baits and spot treatment. Electrical equipment was treated 4 times a year followed by the clubhouse area at 2.5 times per year and landscape areas 1.875 times per year. The rest of the damaged areas in Houston was treated 2 times a year. The highest treatment expenditure was for hardscape damage at $1,348.15 followed by greens ($1,147.32) and landscape areas ($1,124.57). Houston spent $9,598.06 to treat damaged areas due to fire ants. Electrical equipment took 45 hours to treat each year,

pools (8), fairways (6), clubhouse (5), roughs, tees, and landscape (2). Greens required 1 hour of labor for treatment.

Houston's course expenditures included materials, equipment, and professional services for control measures. The golf courses spent the most on materials ($2,288.89). The highest expenditure was for insecticide baits ($1,716.67) followed by individual mound treatment ($572.22). Furthermore, golf courses in Houston spent $196.67 for equipment including $85.56 for sprayers, $77.78 for spreaders, and $33.33 for other miscellaneous equipment. Total professional service expenditure was for professional pest control operators ($188.89).

Medical care in Houston was reported for the course personnel. Bee sting and ant bite solution was used to treat the fire ant stings. Cost to treat medical care for the course personnel was $4.29.

Damage to electrical equipment was reported for television cable (11%), air conditioning (11%), irrigation systems (56%), and outdoor lighting (11%). Replacement expenditure for air conditioning was reported as $285.71, irrigation systems was a costly $11,685.71, circuit boxes was $6.43, and finally outdoor lighting had a replacement cost of $19.29 per golf course in Houston. Course personnel and contract personnel performed labor for repair to electrical equipment damage. Costs to repair the irrigation systems was $514.29, air conditioning ($20.71), circuit boxes ($6.43), and outdoor lighting ($19.29).

San Antonio

San Antonio has a lower metroplex expenditure of $577,991.56 for fire ants than the other metroplexes. The per golf course expenditure for treatment and repair to damaged areas, control measures, medical care, and electrical equipment was $8,027.66. See Table 4.1.

Golf courses in San Antonio reported damage to greens, landscape areas, fairways, tees, clubhouse area, hardscape, roughs, swimming pools, electrical equipment, and other areas. The golf course internal maintenance performed the labor for repairing the damaged areas. Most of the repair expenditure was for repairing the tees ($144.44). Clubhouse area cost $122.22 to repair and roughs cost $116.67 to repair. Golf courses spent $3,928.10 per course for repairs to damaged areas of the course. The golf course internal maintenance treated the damaged areas with baits and individual mound treatments. The clubhouse area had to be treated the most often at 12.5 times a year. Roughs, fairways, and tees were repaired 3.33 times a year, landscape areas required 6 times per year, and lastly, greens, electrical equipment and other damaged areas needed 2.25 times per year for treatment. The fairways were the most costly to treat ($217.22) followed by the roughs ($189.81). The per golf course treatment expenditure for damaged areas was $1,273.27. The most time spent for treating was in the clubhouse area, 12.5 hours a year. Fairways, tees, and roughs required 5 hours of labor to treat, landscape (4) and electrical (1).

San Antonio spent the most for materials to control fire ants. Material expenditure per golf course was $1,747.00. Insecticide baits was the highest expenditure ($847.00), individual mound treatment ($560.00), biologicals and mechanical disturbance ($90.00), and organic materials cost ($160.00) calculated expenditure for materials. San Antonio spent $322.23 per golf course for equipment to control fire ants. Golf courses spent $72.22 for sprayers, $161.11 for spreaders and $89.99 for other miscellaneous equipment. However, golf courses in San Antonio only spent $11.11 for gloves as supplies to aid in fire ant control. Professional services only included lawn maintenance company costs of $266.67 on average per course.

Medical care in San Antonio was only reported for course personnel. The course personnel received treatment from a First Aid Kit costing $4.29.

Electrical equipment damage was reported only to irrigation systems (60%). Replacement expenditure for the golf course irrigation was a minimal $12.50, and costs to repair the damaged area was $462.50.

Importance of Fire Ant Control

After analyzing the expenditures for treatment, repair, replacement and medical care caused by fire ants, that controlling fire ants was important for golf courses (98%). Golf courses in the Texas metroplexes reported they would be willing to spend $1,925.00 a year to control fire ants. This was substantially lower than the amount they were actually spending ($63,494.90) on average each year for fire ant control.

Conclusion

Golf courses in the Texas metroplexes stated that fire ants were somewhat of a problem for them. Some of the golf courses reported that fire ants were becoming a serious problem. The golf course internal maintenance provided the labor to control and repair areas of fire ant infestation. Golf courses reported fire ants did not restrict activities but that they were concerned about fire ants affecting the golfers and the course personnel. The place where humans were most likely to come in contact with fire ants, clubhouses for example, were areas where a significant amount was spent to control fire ant damage. One has to recognize the incredible expenditure for replacement and repair of irrigation systems because of fire ants infestation and attraction to the electricity and water around the irrigation. The golf courses in the five metroplexes spent $25.03 million to replace their irrigation systems due to fire ants. The five metros also spent $216,024.65 to repair their irrigation systems due to fire ant infestation. Each golf course in the five large metroplexes spent $63,494.90 for treatment and repair, control measures, medical care, and electrical equipment expenditure. The overall expenditure on fire ants across the five metroplexes was $29.488 million.

Table 4.1 Comparison of Metroplex and Per Golf Course Expenditure

Per Golf Course Expenditure in the Five Large Metros of Texas						
Expenditure	**Austin**	**Dallas**	**Fort Worth**	**Houston**	**San Antonio**	**Weighted Average**
Repair Costs	$2,111.22	$2,329.66	$1,019.28	$2,524.00	$4,390.60	**$3,746.07**
Treatment Costs	$5,565.08	$5,830.36	$1,800.27	$12,272.51	$3,620.27	**$6,533.17**
Replacement	$151,499.10	$93,981.25	$11,355.56	$11,997.14	$12.50	**$53,208.05**
Medical	$10.00		$18.83	$6.43	$4.29	**$7.62**
Per Golf Course Expenditure	**$159,185.40**	**$102,141.26**	**$14,193.94**	**$26,800.08**	**$8,027.66**	**$63,494.90**

Golf Course Expenditure for the Five Large Metroplexes of Texas						
Expenditure	**Austin**	**Dallas**	**Fort Worth**	**Houston**	**San Antonio**	**Summation of Expenditure**
Repair Costs	$187,898.76	$228,306.56	$84,600.58	$333,167.39	$316,123.22	$1,150,096.51
Control Costs	$495,291.96	$571,374.90	$148,380.78	$1,619,971.17	$260,659.77	$3,095,678.58
Replacement	$13,501,077.50	$9,210,162.50	$942,511.11	$1,583,622.86	$900.00	$25,238,273.97
Medical	$890.00		$1,562.99	$848.57	$308.57	$3,610.13
Metro Golf Course Expenditure	**$14,185,158.22**	**$10,009,843.95**	**$1,177,055.46**	**$3,537,609.99**	**$577,991.56**	**$29,487,659.19**

Figure 4.1 Golf Courses by Number of Holes

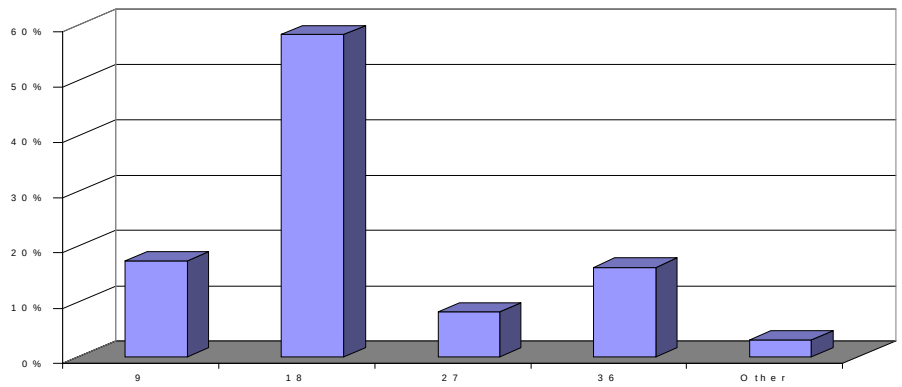


Figure 4.2 Season of Fire Ant Problems

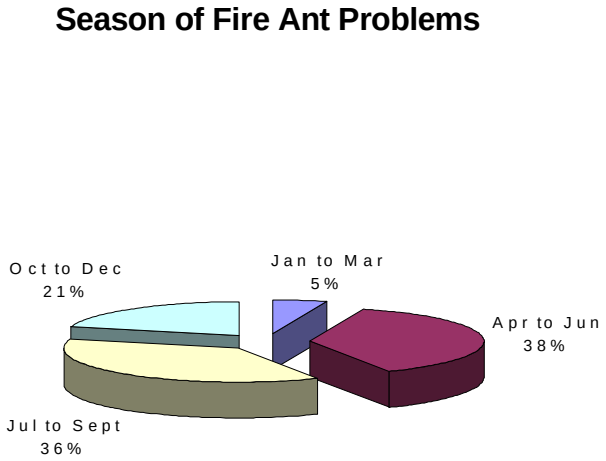


Figure 4.3 Willingness to Spend To Control Fire Ants

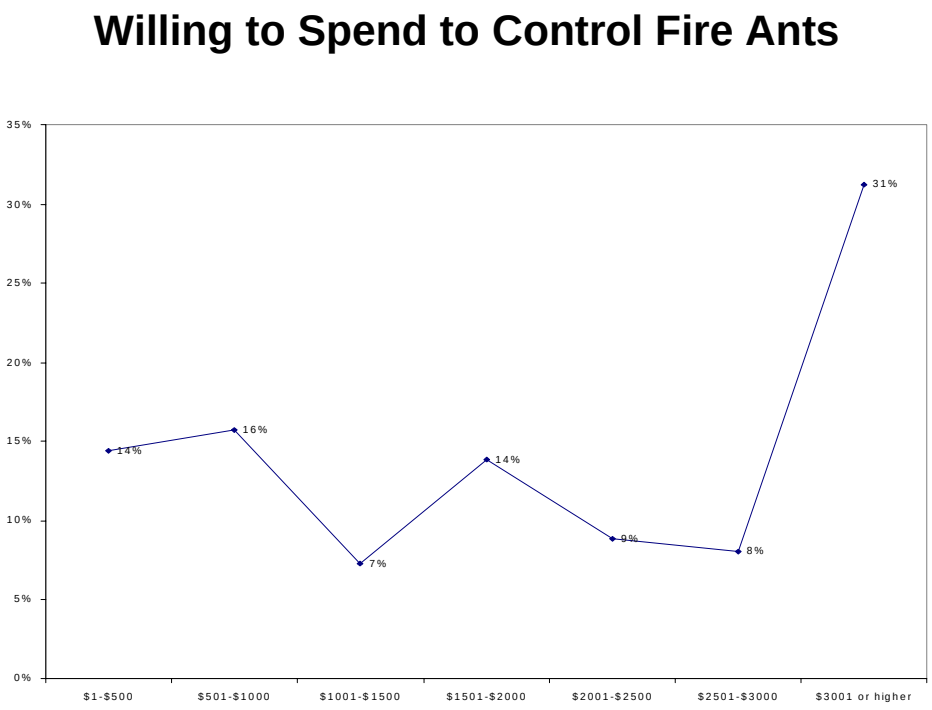


Figure 4.4 Sources of Fire Ant Information for Golf Courses

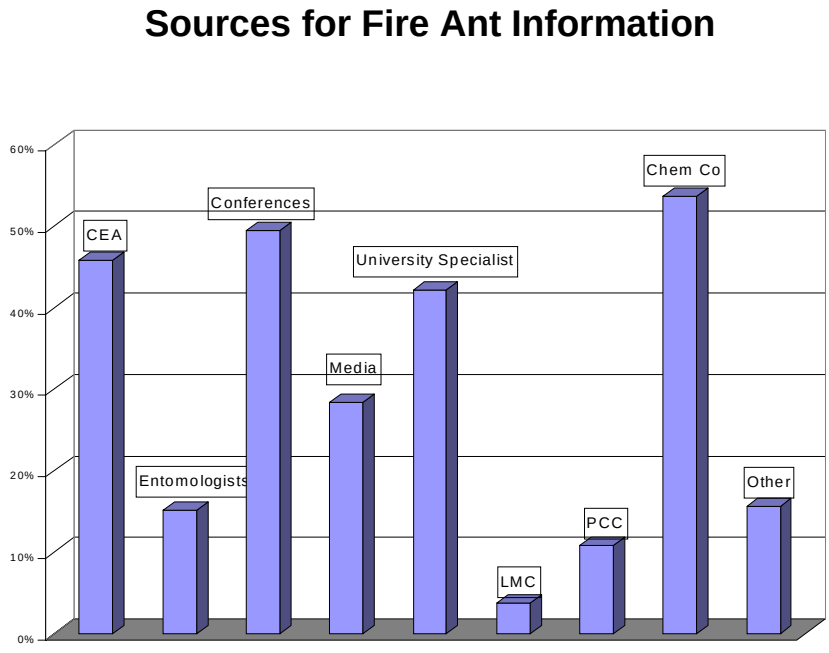


Figure 4.5 Med. Expenditure for Metros, Golf Courses

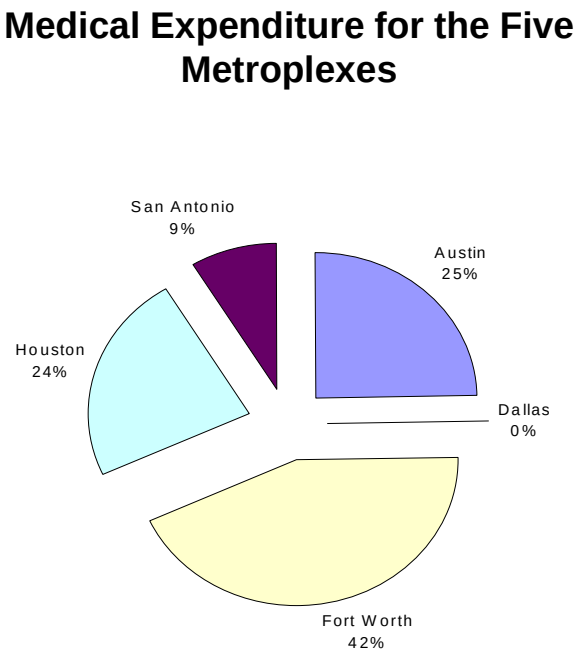


Figure 4.6 Repair/Replacement of Electrical Equipment, for Golf Courses

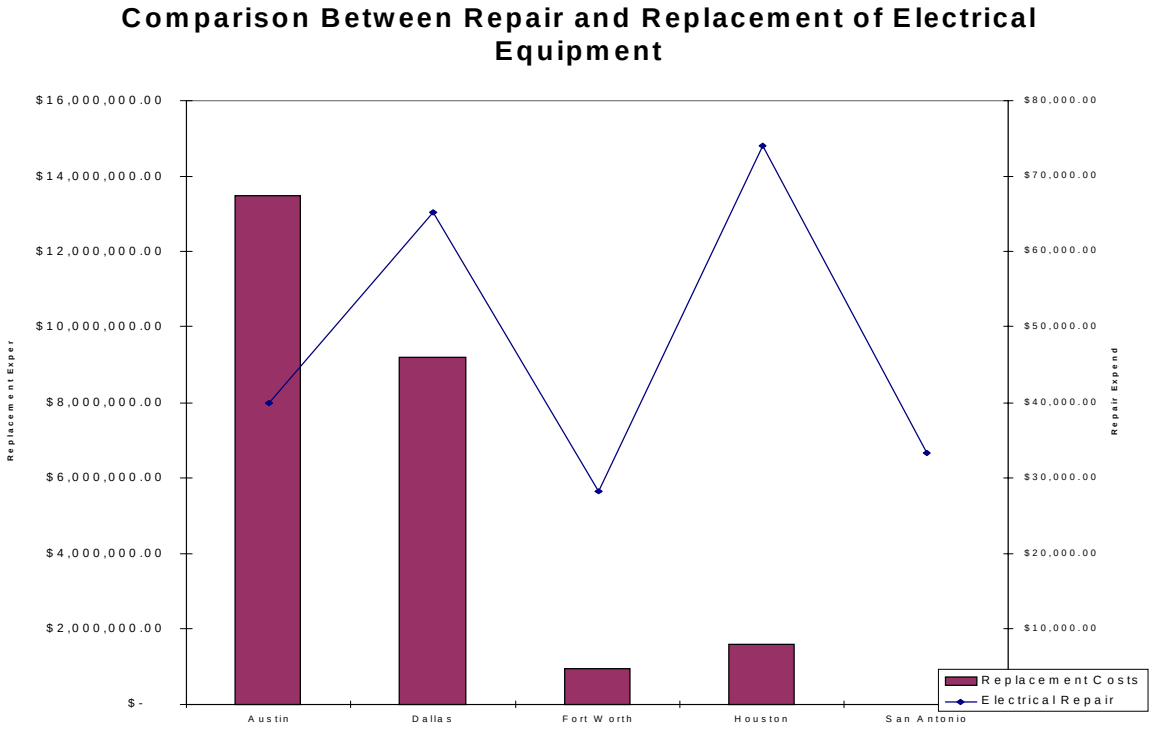


Figure 4.7 Per Golf Course Expenditure for Golf Courses

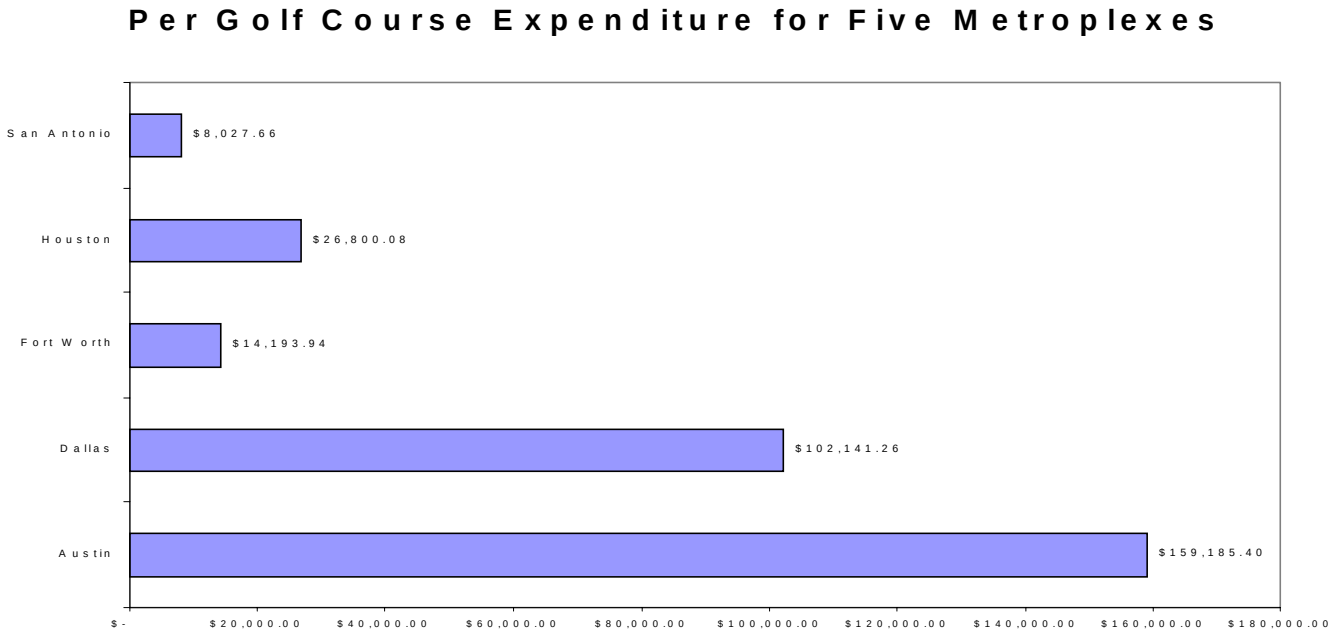
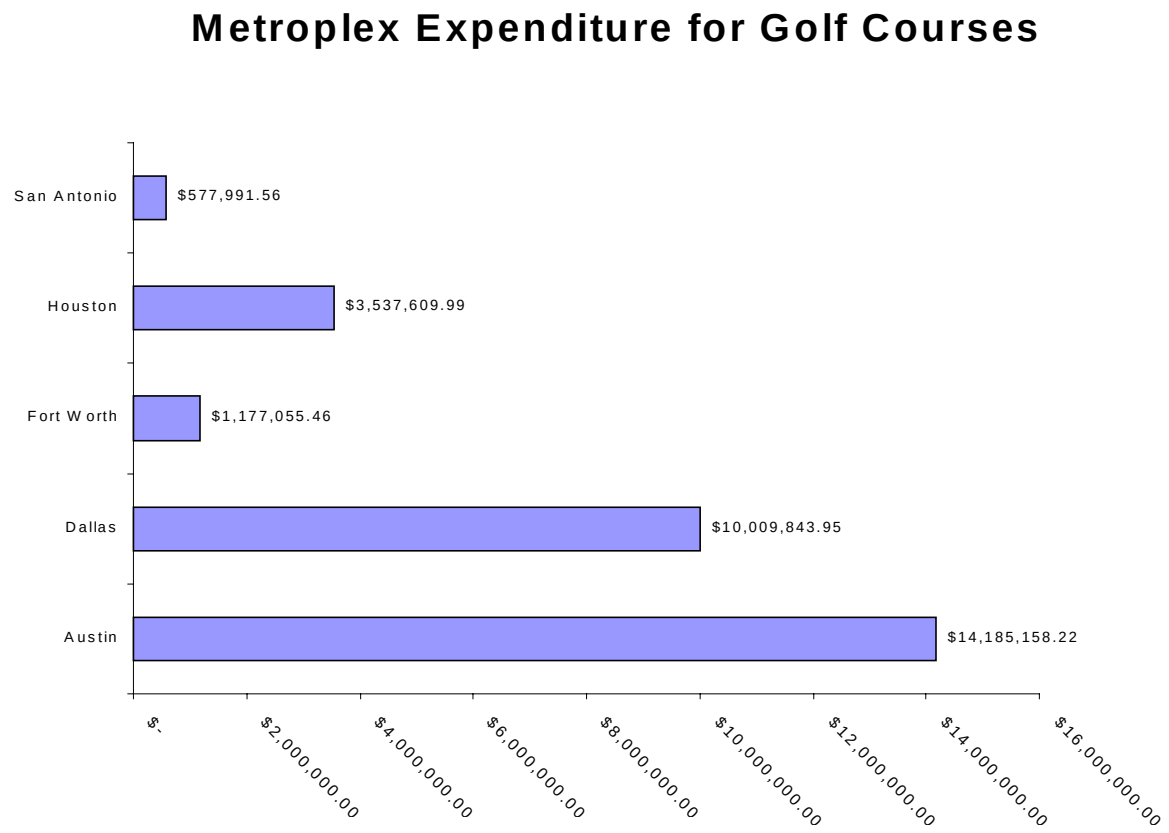


Figure 4.8 Metro Expenditure



Chapter 5: The Economic Impact of Fire Ants on Schools

Summary of Results

The schools sector accounts for more than $25.4 million in economic impact of fire ants in Texas metro areas. Average expenditure per school responding to the survey was $4,954. The leading share of school expenditure (71%) was treatment measures, both by hired professional service companies and by school staff. The Dallas schools responding to the survey reported expenditures that averaged two and even three times larger than schools in the other metro areas.

Description of Metroplex Educational Institutions

A total of 52 schools responded to the survey, more than one-half of which were post-secondary schools. The respondents included 4-year colleges and universities (39%), 2-year colleges (16%), public school systems (33%), and a few private schools (5%). Another 7% of the respondents were institutions not fitting any of these categories, including a seminary. The grounds at the schools were extensive, averaging 110.9 acres. The school grounds included 5.69 athletic fields on average, which covered 23.1 acres on average.

Definition of Problem

Fire ants were considered “somewhat of a problem” for 66% of the educational institutions that responded. Nineteen percent of respondents characterized the fire ant problem as “serious,” and 15% said fire ants are “not a problem.” Problems occurred most often in July-September (72%) and April-June (63%).

Magnitude of Fire Ant Problem

School grounds and landscapes were the most common areas in which fire ants presented problems, with 69% and 63% of schools reporting these problem areas,

respectively. Playgrounds and athletic fields were considered problem areas by fewer than one-half of the respondents.

Almost three-fourths of the respondents indicated that fire ants did not restrict activities at the educational institution. Among those reporting that activities were curtailed, children playing outside was most frequently restricted. Children's play was restricted at 18% of the schools. This is a relatively small percentage of the total number of schools responding, but it accounts for nearly one-half of the elementary/secondary school systems in the sample.

Valuation of Curtailed Activities

The average value of curtailed activities reported by the schools was $44.16. It should be noted that reporting the value of the curtailed activities was difficult for these respondents. Sixty percent did not respond to the question, and among those who responded, values were evenly scattered across the categories. The range of $101-200 was reported most often as the value of being able to have the activities without any disruption, but only 5 respondents reported this figure.

Description of School Expenditures

Schools in Texas metroplexes reported repair costs for outside damage areas in playgrounds, school grounds, buildings, outside electrical equipment, landscape, and hardscape areas. Repairs to playgrounds cost $119 per school, on average, and were required about 9 times per year. Costs per school for repairs to grounds were $178, to buildings $99, and to outside electrical equipment $121. Expenditures for repairs to landscape were the largest item, averaging $347 per school responding.
The responding schools indicated widely varying costs of damage to electrical equipment. Houston schools reported no repair or replacement costs, and San Antonio reported averages of less than $20 per school. Dallas schools indicated electrical repair and replacement costs in excess of $1,100 per school, including repair of air conditioning ($536 per school), outdoor lighting ($132 per school) and irrigation systems ($213 per school). Responding schools in the Fort Worth area averaged $383 in electrical repair costs, and Austin schools reported $250.

Expenditures for Treatment

Texas schools in the five metroplexes reported expenditures for treatment for fire ants totaling $18.4 million. Treatment expenditures at schools were higher, on average, than repair costs (Figure 1). Just below one-half of the spending ($3.16 million) was for activities undertaken by school personnel. Materials purchased for application by school employees, primarily insecticide mound treatments, account for the largest share of the cost of treatments conducted by school staff. The majority of schools expenditures for treatment ($ 4.17 million) was to hire professional services to control fire ants.

The average expenditure per school for treatment was $1,480. Respondents indicated costs of $848 per school of treating for fire ants, which includes labor and time of school personnel, and the costs for materials, supplies, and equipment to apply treatments. In a separate question, school officials reported expenditures of $929 per school for professional pest control companies hired to treat for fire ants. Of the 52 responding schools, 48 hired professional services.

The Dallas schools reported larger average expenditures for treatment of fire ants than the other metro areas, $3,294 per school in Dallas. Treatment of playgrounds and athletic fields were among the highest cost items. An additional $1,386 per school was reported for materials, equipment, and supplies to treat school property in Dallas. Average costs per school on materials in the 5 metro areas ranged from a low of $285 per school in Austin, to the high of $1,078 per school in Dallas. Insecticide mound treatments and baits were the most common methods used by schools to control fire ants. In addition to mound treatment and baits, schools in Houston and San Antonio reported small expenditures on mechanical, biological, or organic measures (from $20-70 per school).

Nearly all the schools hired professional services to control fire ants, and they indicated widely varying expenditures for such services. Fort Worth schools reported average expenditure on professional control services of $16.67. Austin and Houston schools reported the highest average cost, at $1,560 and $1,459 per school, respectively.

Fire Ant Information Sources

Private industry was the most frequent source of information about fire ants for educational institutions in Texas. Sources of information about fire ants included pest control companies (54%), [5] chemical companies (37%), and county extension agents (35%). Conferences were a source of information to 29% of the schools.

Importance of Control and Willingness to Pay

Ninety percent of the responding schools indicated that it is important to the institution to control fire ants. Willingness to pay to control fire ants ranged widely, from less than $500 (20%), to more than $3001 (20%). On average, schools in the metroplexes were willing to spend around $1,500 to control fire ants.

[5]Respondents indicated more than one information source, so the percentages shown indicate the share of the sample using that resource and the total is greater than 100%.

Table 5.1. Summary of fire-ant related expenditures by schools and by metroplex, 1998

Per school expenditures						
	Austin	Dallas	Fort Worth	Houston	San Antonio	*Total*
			In dollars			
Treatment	1,980	5,519	985	3,597	3,038	*3,532*
Repair	350	3,453	1,123	333	418	*1,326*
Replacement	0	264	0	0	5	*75*
Medical	126	5	71	0	0	*22*
Total per school	2,456	9,240	2,179	3,930	3,461	***4,954***
Per metro expenditures in schools						
	Austin	Dallas	Fort Worth	Houston	San Antonio	*Total*
Treatment	817,740	7,278,189	592,884	6,803,224	2,892,886	*18,384,923*
Repair	144,550	4,319,525	676,247	468,000	1,012,885	*6,621,207*
Replacement	0	330,503	0	0	4,423	*334,925*
Medical	52,141	5,686	42,642	0	0	*100,469*
Total Per Metro	1,014,431	11,933,903	1,311,772	7,271,224	3,910,193	***25,441,524***

Figure 5.1 Total per School Expenditure by Cost

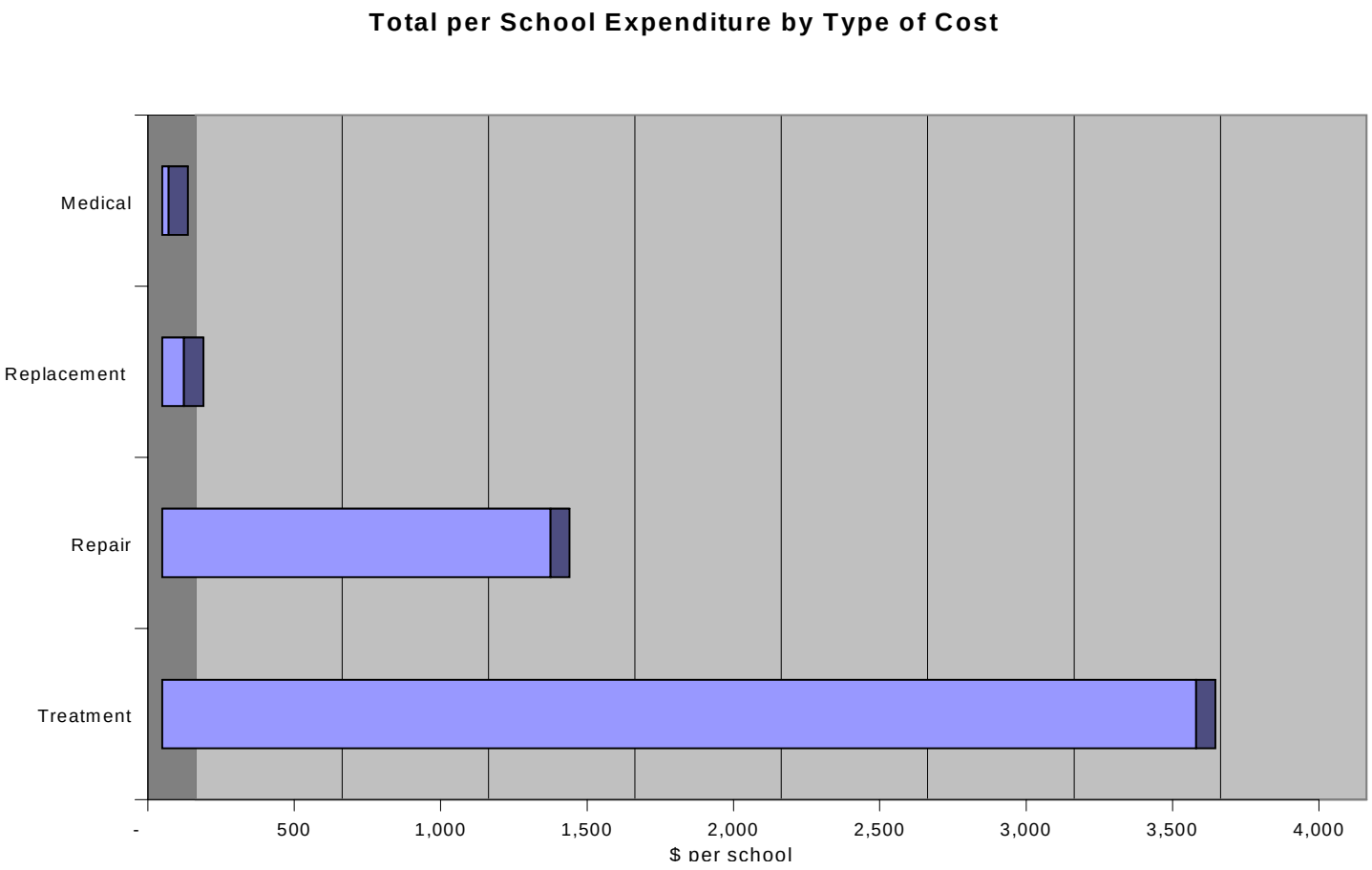


Figure 5.2 Where are School Problem Areas

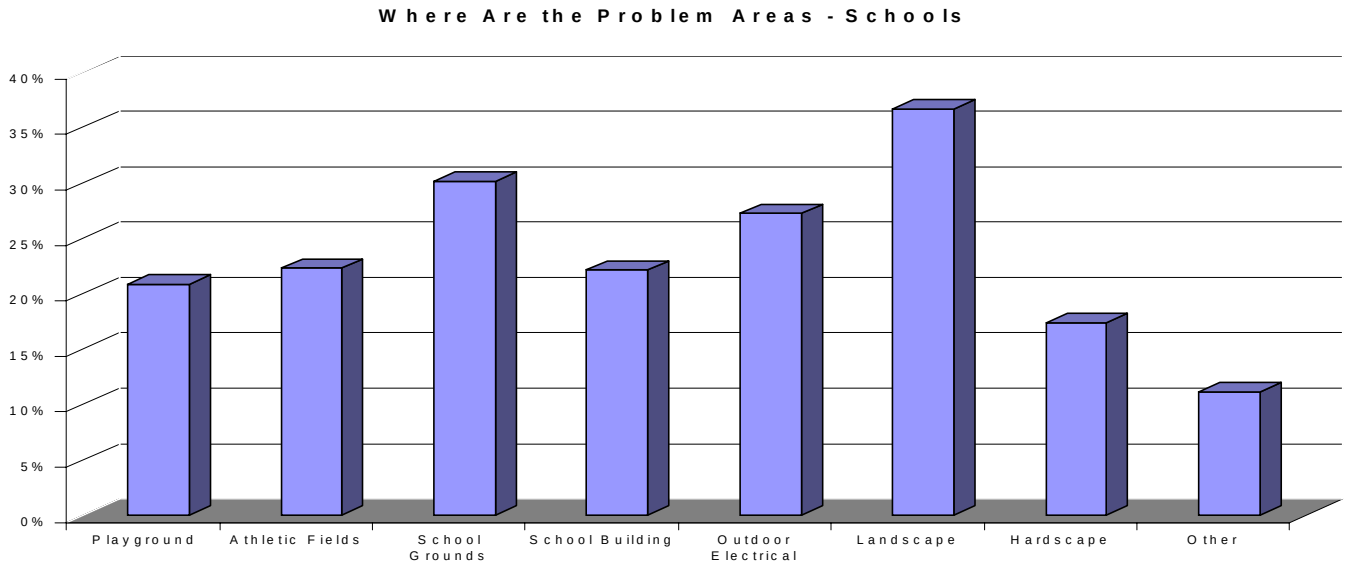
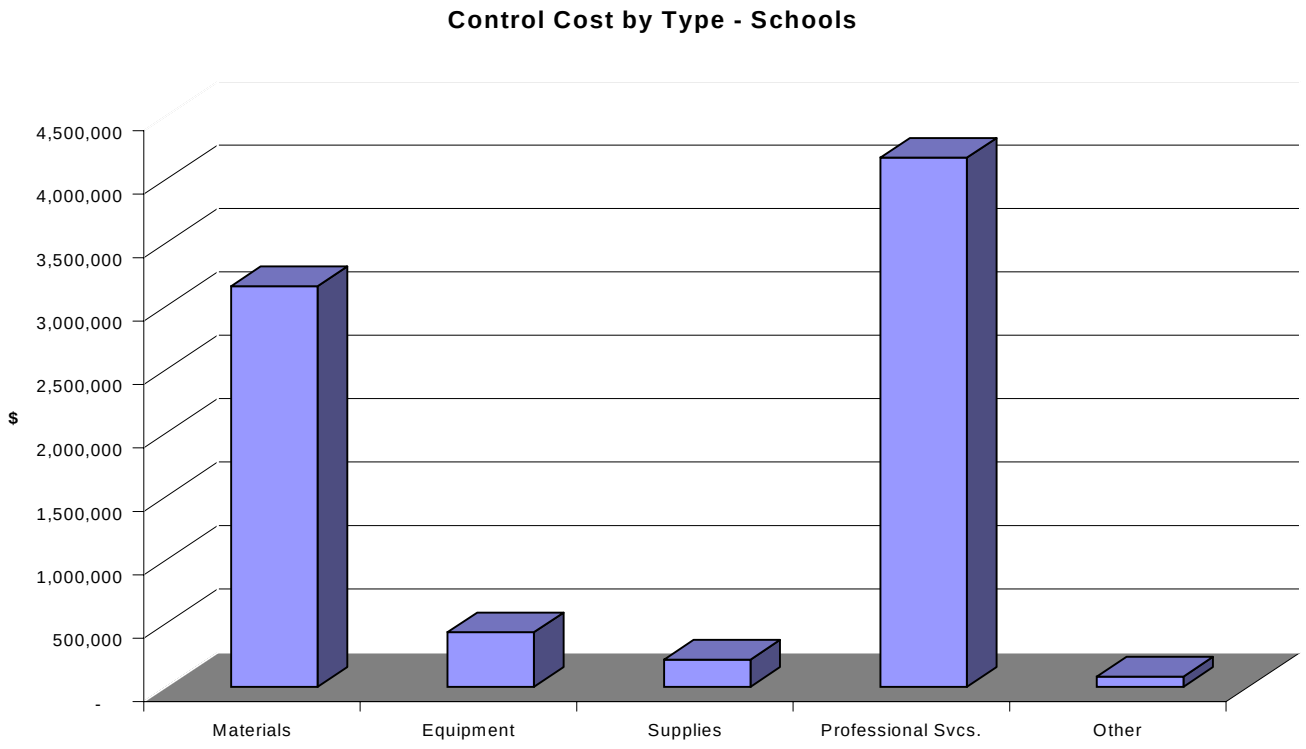


Figure 5.3 Control Costs by Type



Chapter 6: The Economic Impact of Fire Ants on Cities

Summary of Results

This chapter reports the results of the city survey portion of the study which included Austin, Dallas, Fort Worth, Houston, and San Antonio. These data are then expanded to represent economic impacts for the five metroplex areas respectively and totaled for the metroplex regions of the State.

Description of Metroplexes

The area within Texas metroplexes that is susceptible to fire ant damage is extensive. On average, the cities managed approximately 225 individual sites (including parks, buildings, airports, cemeteries, etc.), comprising a total of 20,771 acres. The types of properties maintained by the cities and their respective acreage includes 7,704 acres of parks, 2,987 acres of grounds, 576 acres of athletic fields, 605 acres of recreational areas, 392 acres of swimming complexes, and 8,507 miscellaneous acres of office and other building areas.

Define Fire Ants as a Problem

Virtually all (97%) of Texas metroplex cities reported problems with fire ants, with 44 percent stating fire ants as “somewhat of a problem” and 38 percent viewing fire ants as a “serious problem”. However, the problems associated with fire ants were seasonal with 56 percent of the respondents indicating problems during the months of April to September. The specific areas in which respondents indicated damages occurred included lawns/landscapes, parks, roadways, athletic fields and swimming complexes. This was expected a priori due to the significant portion of “grass areas” in these respective areas. However, 41 percent of the respondents also indicated problems occurring with electrical equipment, preserves, and sewage plants.

Valuation of Curtailed Activities

Only 34 percent of the cities indicated that fire ants restricted the city or its citizens from conducting outdoor activities. The majority of respondents indicated that even though fire ants were a problem, outdoor activity prevailed. Of those activities that were limited or curtailed, maintenance activities were the most common (11% of the cases), with 8 percent also indicating activity associated with wildlife productivity, game preserves, and even burial services.

An interesting follow-up question asked of respondents was *how much would it be worth* to the city to not have these activities disrupted by fire ants in any way. While responses to this question were too sparse to report any meaningful results, subsequent non-response inquiry revealed that uninterrupted or curtailed activities would indeed be worth paying for, but assessing an actual dollar amount proved to be too cumbersome for the respondents.

Metroplex Expenditures

The remainder of the survey ascertained the expenditures associated with fire ant damages including: costs to repair fire ant damaged areas; costs associated with treating fire ant infested areas; costs to control fire ants (materials, equipment, supplies, and professional services); costs associated with medical treatments to humans and animals suffering from fire ant attacks; costs for replacing and/or repairing electrical equipment. These data are reported individually.

Repair costs

Costs for repairing areas damaged by fire ants averaged $901 per city and totaled $11,370 for the entire metroplex areas. These repairs were made by city maintenance staff, parks departments, aviation employees, and private contractors. Outdoor lighting fixtures and city parks were by far the most often repaired areas, however lawn areas and airport areas were the most expensive areas to repair ($5,267 and $2,579 respectively).

Treatment costs

Persons performing the various treatments of fire ant infested areas included city staff, licensed applicators, contractors, parks departments, and aviation employees. There were various types of fire ant treatments made by respondents, including the use of insecticide mound treatments, insecticide baits, biological controls, mechanical disturbance, and other specialized remedies. The areas receiving the greatest number of treatments were lawns/landscapes, parks, athletic fields, and cemeteries, with a total of 1,020 hours being expended on fire ant treatment activities during the course of an "average" year. The total costs of performing these treatment activities averaged $19,889 per city, totaling to $226,740 for the entire metroplex areas.

Control costs

Control costs were delineated as those made for materials, equipment, supplies, and professional services. The primary materials expenditures were for insecticide mound treatments and insecticide baits, followed closely by the use of biological controls (nematodes, mites, etc.) and other specialized remedies. The total cost of such materials averaged $12,899 per city and totaled $147,048 for the entire metroplex areas. Other miscellaneous items not specified averaged $873 per city and totaled $9,955 for the entire metroplex areas.

Various small equipment items were utilized to control fire ants such as sprayers (for insecticide treatments), spreaders (for granular insecticide applications), and other

miscellaneous equipment (shovels, etc.). These equipment costs averaged $1,343 per city and amounted to $21,230 for the entire metroplex areas. Cities also provided various supplies to personnel responsible for fire ant maintenance such as gloves, repellent sprays, special shoes, and other protective clothing items. These supply costs averaged $1,343 per city and totaled to $15,306 for the entire metroplex areas.

Some cities also enlisted the aid of professional services to aid in their fire ant control measures. These companies included lawn maintenance firms, professional pest control companies, specialized internal city maintenance crews, and other city licensed applicators. Expenditures made on these services averaged $1,666 per city and totaled $18,988 for the entire metroplex areas.

Medical costs

While detailed information about the nature of fire ant-related injuries was solicited, most cities surveyed indicated that no records were maintained on a historical basis regarding the types and duration of medical expenses incurred due to the effects of fire ant attacks on human and animal life. Only an overall cost of medical treatment was provided that averaged $1,463 per city and totaled to $16,677 for the entire metroplex area. There was anecdotal evidence provided of injury and even fatality of various wildlife, however no costs were specified.

Electrical repair and replacement costs

The survey also solicited data regarding the costs of repairs made to (and/or replacement of) electrical equipment maintained by the metroplex cities. Said repairs or replacements were made by city electricians, city repair technicians, or other city personnel. In the case of repairs made, air conditioning units, circuit boxes, and irrigation systems were listed as the most expensive items to repair, averaging $14,572, $22,955, and $15,817 per city, respectively. Total electrical equipment repairs made by all metroplex cities amounted to $71,124. Replacement costs for those equipment items needing replacement (primarily the same items listed above) totaled $74,015 for

the entire metroplex areas.

Importance of fire ant control

The majority (68%) of responding cities indicated that controlling fire ants was important to the city and its' citizens. As a measure of quantifying their level of importance, respondents were asked to express how much they would be willing to spend on an annual basis in controlling fire ants. As with the previous "willingness to spend" question discussed earlier, responses to this question were too sparse to form any meaningful conclusions. But obviously, cities are willing to spend a considerable sum on fire ant control, given the level of expenditures discussed herein. Respondents simply found it cumbersome (or were reluctant) to quantify their willingness to pay.

Because fire ant control measures represent significant expenditures for the state's metroplexes, obtaining the most up-to-date information regarding fire ant control is vital in spending city funds wisely. Responding cities listed the media, conferences, county extension agents, and university specialists as their primary sources of information.

Summary

Fire ant-related expenditures for Texas metroplex cities are summarized in Table 6.1. The average level of expenditures per city amounted to $53,628. For the entire metroplex cities of Texas, a total of $612,453 was expended in controlling fire ants.

Table 6.1. Summary of fire ant-related expenditures by city and by metroplex, 1998.

Total Per City Expenditures						
Type of cost	*Austin*	*Dallas*	*Fort Worth*	*Houston*	*San Antonio*	**Weighted Average**
Repair Damage Cost	$1,400.00		$1,700.00	$1,000.00		**$901.32**
Treatment Cost	$9,625.50	$500.00	$59,886.00	$25.00	$6,000.00	**$19,889.43**
Control Cost	$11,312.41	$54,825.00	$4,488.33	$11,050.00	$1,600.00	**$18,642.71**
Medical Cost	$15.00		$5,000.00			**$1,462.91**
Replacement Cost	$2,100.00	$4,250.00	$17,550.00			**$6,492.54**
Electrical Repair Cost	$3,450.00	$10,650.00	$9,500.00	$1,800.00		**$6,238.95**
Total per City	*$27,902.91*	*$70,225.00*	*$98,124.33*	*$13,875.00*	*$7,600.00*	
					Total per City	**$53,627.85**

Total per Metro Expenditures						
Type of cost	*Austin*	*Dallas*	*Fort Worth*	*Houston*	*San Antonio*	**Total Expenditures**
Repair Damage Cost	$3,629.05		$5,661.00	$2,080.00		**$11,370.05**
Treatment Cost	$17,422.16	$1,385.00	$199,420.38	$52.00	$8,460.00	**$226,739.54**
Control Cost	$20,475.46	$151,865.25	$14,946.14	$22,984.00	$2,256.00	**$212,526.85**
Medical Cost	$27.15		$16,650.00			**$16,677.15**
Replacement Cost	$3,801.00	$11,772.50	$58,441.50			**$74,015.00**
Electrical Repair Cost	$6,244.50	$29,500.50	$31,635.00	$3,744.00		**$71,124.00**
Total per Metro	*$51,599.32*	*$194,523.25*	*$326,754.02*	*$28,860.00*	*$10,716.00*	
					Total Metroplex	**$612,452.59**

Figure 6.1 Per City Expenditure

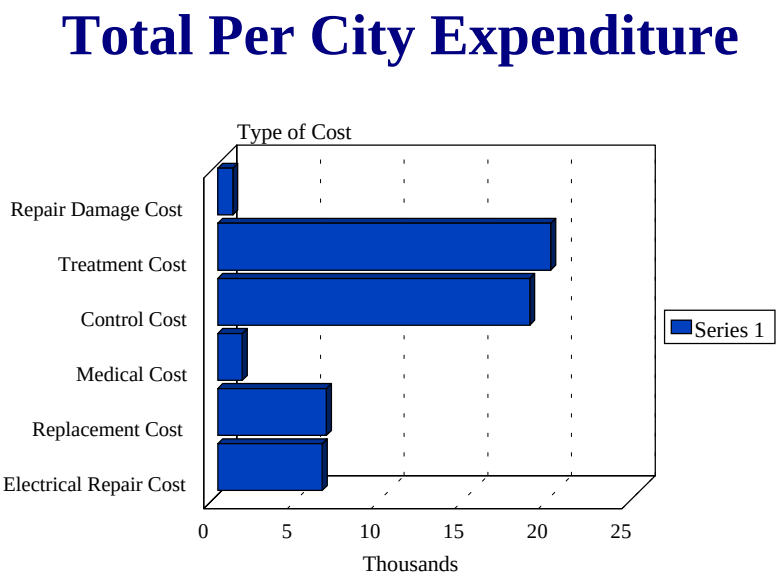


Figure 6.2 Total Per Metro Expenditure

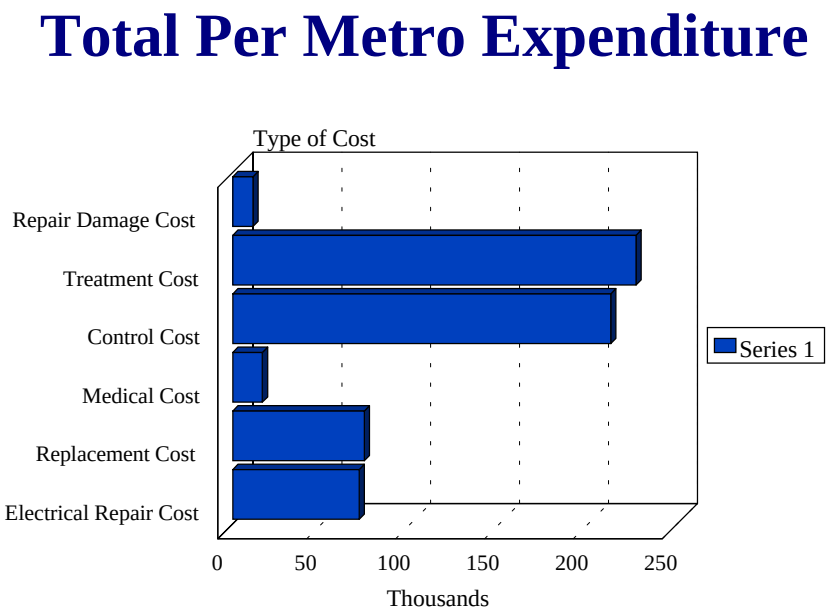


Figure 6.3 City by Total Metro

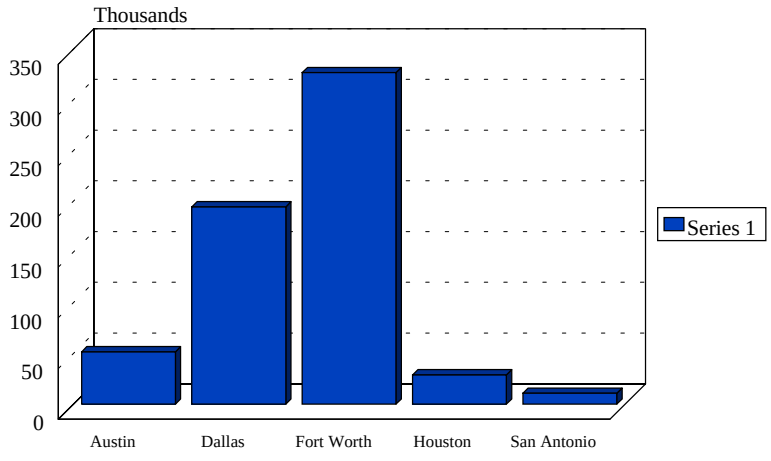


Figure 6.4 Size in Acres

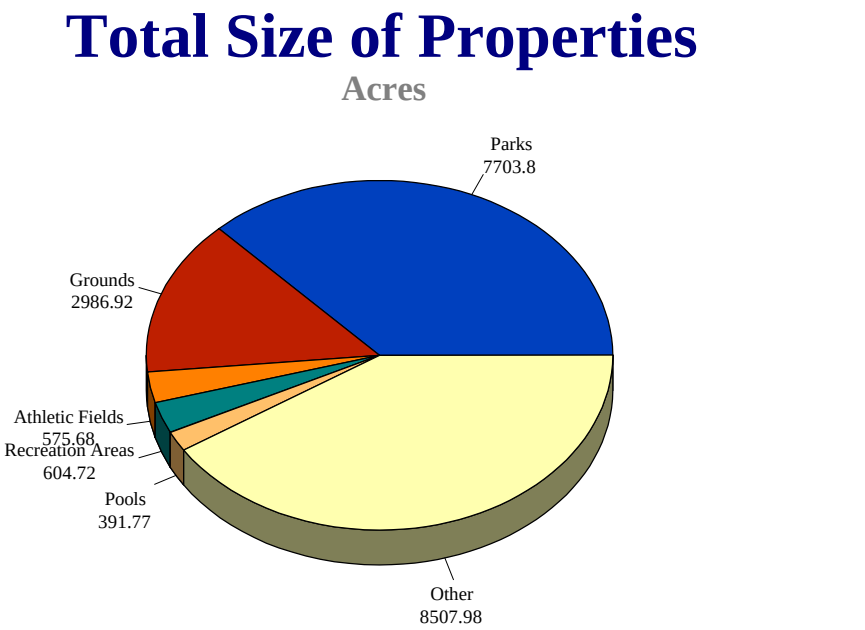


Figure 6.5 When is Problem

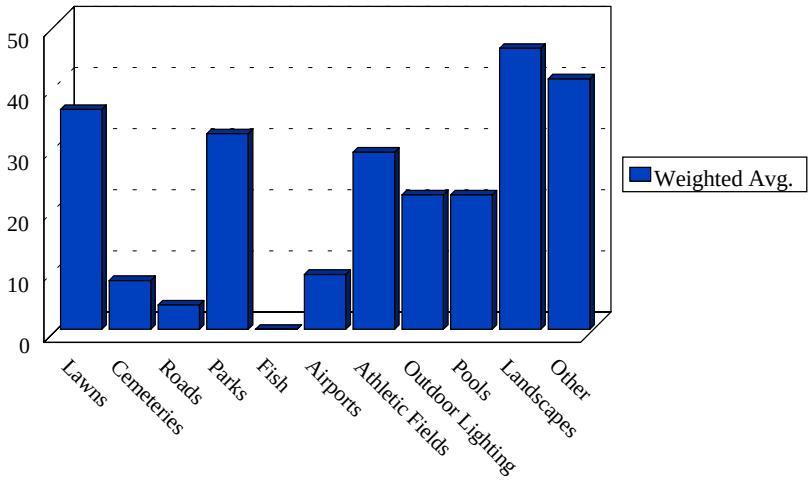


Figure 6.6 Problem Areas

Damage Repair Costs by Area
Total Metro

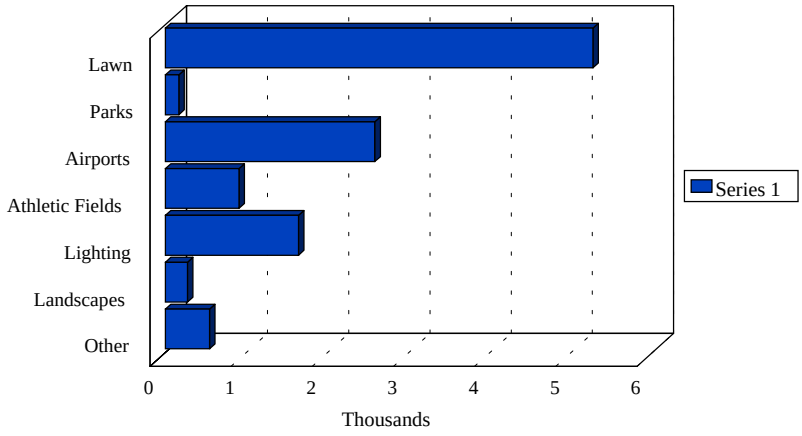


Figure 6.8 Treatment Cost

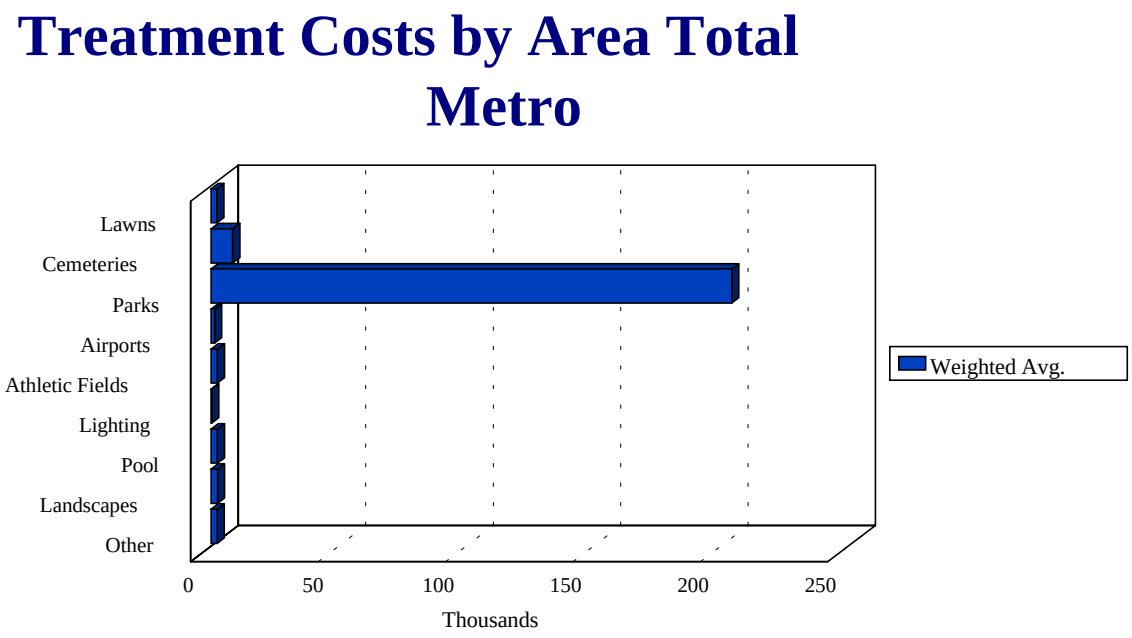
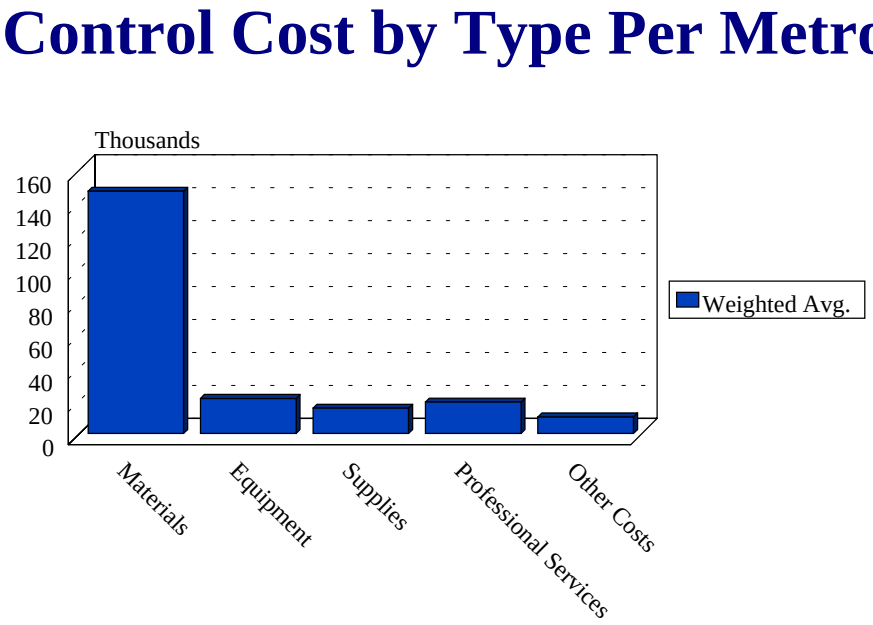


Figure 6.9 Control Cost



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Contents of the Appendices will be made available upon request.

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